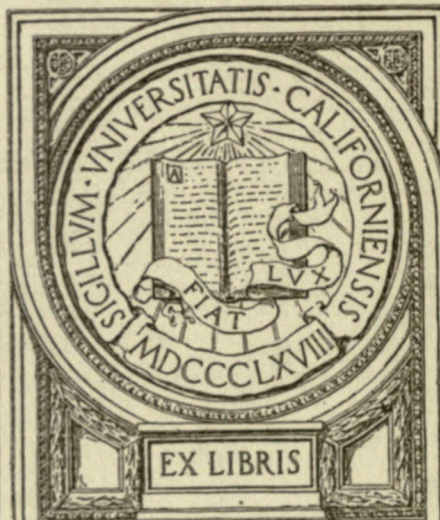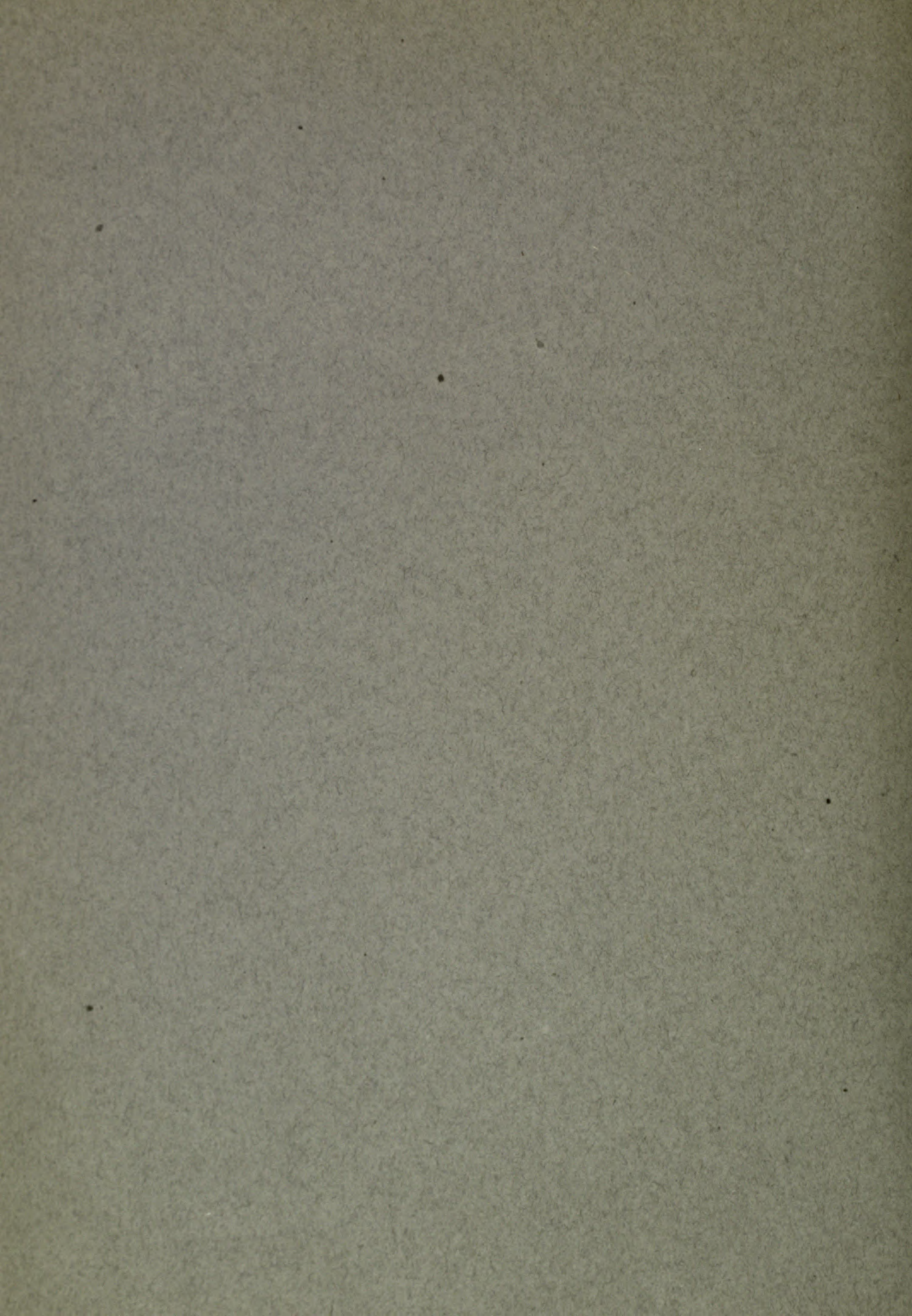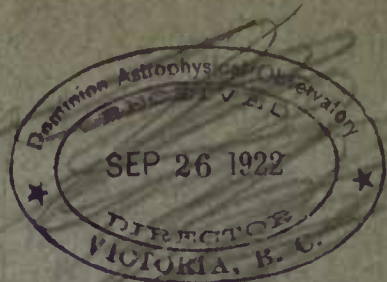The University of Chicago

Publications of the Yerkes Observatory

VOLUME IV PART III

PARALLAXES OF FIFTY-TWO STARS

BY

GEORGES VAN BIESBROECK
AND
MRS. HANNAH STEELE PETTIT

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By Georges Van Biesbroeck and Mrs. Hannah Steele Pettit

Since Part I of the present volume was issued, no essential modifications have been introduced in the methods of observing or reducing the stars of which the parallaxes are discussed in this section. The same yellow color-filter mentioned previously was used throughout the work. The apparent brightness of most of the brighter stars included here has been reduced to the mean magnitude of the comparison stars by means of the double rotating sector mentioned in the Introduction (this volume, p. 2). This apparatus has been described by Mr. Lee in *Astrophysical Journal*, Vol. XLIV (1916), pp. 59–61, and has been used successfully since 1916. The probable errors of the parallaxes obtained with the use of this device are exactly of the same order as those that correspond to fields where the reduction of brightness could be obtained by the previous single sector or where no sector was used.

Two different machines have been used for measuring the plates: the scale-machine, described by F. Schlesinger in *Astrophysical Journal*, Vol. XXXIII (1911), p. 10, and the more recent screw-machine, described by O. J. Lee and Hannah B. Steele in the Appendix to Part I of this volume, p. 65. Preference was given to the latter whenever the field of the star was small enough (17.5×19 cm), because this instrument may be operated much faster. But in many cases where the comparison stars are farther away from the center, the plates had to be measured in the old machine which takes in the whole field of the 20×25 cm plates. The reductions show which machine has been used, because the unit of measurement is different: the old machine gives the "solutions" in units of $\frac{1}{4}$ mm, while with the new one the units are 1 mm.

The gain of accuracy obtained by measuring plates in longitude instead of in right ascension is small as compared with the inconvenience of lining up the plates at an angle in the machine, instead of in the normal position. Often this could be done only after cutting one or two corners of the plate, which appeared objectionable for fear of distortion. All the fields discussed here have therefore been measured in the normal position, viz., with the direction of right ascension parallel to the scale or screw. The correct orientation was obtained in most cases from known stars in the field and referred to the equinox of 1900. The rectangular co-ordinates taken from the *Astrographic Catalogue* are especially convenient for this purpose. The proper motions in right ascension deduced at the same time with the parallaxes are therefore always referred to the same epoch, 1900.

The approximate mean magnitudes of the comparison stars are given on the Harvard scale. The magnitudes and spectra of the brighter parallax stars are taken from *Harvard Annals*, Vol. L; for the fainter ones the original B.D. estimates have been retained.

Some of the stars in this series are doubles, both components of which have been measured independently. Forty-eight fields have been discussed, but the total number of determinations of parallax is really 52. They are distributed as follows among the different measurers: Miss Vera M. Gushee and Mr. E. I. Yowell together, 1; Miss Julia May Hawkes, 1; Mr. O. J. Lee,[1] 2; Mr. Edison Pettit, 5; Miss Hannah B. Steele, since 1918 Mrs. Hannah Steele Pettit, 18; Mr. G. Van Biesbroeck, 21. In the column "Observers" the following abbreviations have been used: F = P. Fox; Fa = Miss A. H. Farnsworth; HP = Mrs. Hannah Steele Pettit; J = A. H. Joy; Jr = F. C. Jordan; L = O. J. Lee; M = S. A. Mitchell; P = E. Pettit; Sl = F. Slocum; St = Miss H. B. Steele; Su = F. R. Sullivan; V = A. van Maanen; VB = G. Van Biesbroeck; and Y = E. I. Yowell.

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[1] On leave of absence from the Observatory from July, 1917, to June 30, 1919, to serve as director of the Chicago School of Navigation of the United States Shipping Board.

Miss Inez Wendell has helped very effectively in the computational part of the work.

Anonymous (0^h45^m, $+57°45'$)

A proper motion of $1''.50$ in $72°.2$ has been found for this 11.5 magnitude star by E. P. Hubble (*Astronomical Journal*, Vol. XXIX [1916], p. 168). It is situated in the field of W and η Cassiopeiae. It has a decided yellowish tinge. The eleven plates were measured by Mrs. Pettit.

TABLE 1
PLATES OF ANONYMOUS (HUBBLE) 0^h45^m

No.	Date	Hour Angle	Observers	Quality of Images
2355......	1915 Nov. 6	0^h0	Su, L	Good
2718......	1916 Aug. 17	$+0.2$	Su, L	Good
2942......	Nov. 19	-0.1	Su, L	Good
3331......	1917 Aug. 2	0.0	VB, Su	Good
3364......	Aug. 26	$+0.2$	VB, Su	Good
3506......	Dec. 13	0.0	VB,	Fair
3508......	Dec. 16	0.0	VB, St	Good
3927......	1918 Aug. 10	-0.2	VB, St	Good
3934......	Aug. 18	$+0.1$	VB, St	Fair
3961......	Aug. 25	-0.1	VB, St	Good
4248......	Dec. 19	$+0.1$	VB, HP	Good*

* One exposure only.

COMPARISON STARS

No.	Diameter (Pl. 2355)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1............	0.20	-17	$+35$	$+0.272$
2............	.14	-16	-83	.294
3............	.20	0	$+29$	.194
4............	.24	$+8$	$+41$	.152
5............	.20	$+25$	-26	$+0.088$
Parallax star...	0.18	-5.8	-4.6	....

The mean magnitude of the comparison stars is about 11. No rotating sector was used on this field.

TABLE 2
REDUCTIONS FOR ANONYMOUS (HUBBLE) 0^h45^m

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	mm					
2355....	$+0.199$	1.0	-0.59	-698	$+0.002$	$+0''02$
2718....	.316	0.9	$+.69$	-413	$-.001$	$-.01$
2942....	.346	0.9	$-.65$	-319	$-.001$	$-.01$
3331....	.458	1.0	$+.83$	-63	$+.003$	$+.03$
3364....	.460	1.0	$+.57$	-39	$-.004$	$-.04$
3506....	.502	0.6	$-.85$	$+70$	$+.002$	$+.02$
3508....	.502	0.9	$-.87$	$+73$	$+.002$	$+.02$
3927....	.604	0.8	$+.76$	$+310$	$+.002$	$+.02$
3934....	.608	0.8	$+.69$	$+318$	$+.002$	$+.02$
3961....	.606	0.9	$+.59$	$+325$	$-.001$	$-.01$
4248....	$+0.646$	0.7	-0.88	$+441$	$+0.001$	$+0.01$

The normal equations are:

$$9.5\,c - 2.475\,\mu + 0.628\,\pi = +4.431$$
$$113.450 \quad +4.394 = +3.328$$
$$4.983 = +0.497$$

from which

$$c = +0.476$$
$$\mu = +0.0395 = +0''.423 \qquad \mu_a = +0^s.193$$
$$\pi = +0.0052 = +0''.056 \pm 0''.008$$

Probable error corresponding to unit weight,

$$\pm 0.0016 = \pm 0''.017$$

No other determination of parallax is available for this star.

48 ω Andromedae (1^h22^m, $+44°53'$)

This star was put on our observing program to check the rather appreciable parallax indicated for it by the observations of Flint and Jewdokimov. Its magnitude is 5.0 and spectral type F 5. The proper motion, $+0^s.0324$ and $-0''.096$, is ascribed to it by Boss. The ten plates described in Table 1 were measured by Miss Steele.

TABLE 1
PLATES OF ω ANDROMEDAE

No.	Date	Hour Angle	Observers	Quality of Images
1850......	1914 Nov. 26	-0^h7	Su, L	Fair
1890......	1915 Jan. 2	-0.2	L	Good
2177......	Aug. 8	-0.5	Su	Good*
2224......	Aug. 28	-0.1	Su	Fair
2367......	Nov. 13	-0.2	VB, L, Su	Fair*
2705......	1916 Aug. 6	-0.2	Su, L	Good
2706......	Aug. 6	$+0.1$	Su, L	Good
2924......	Nov. 9	-0.5	Su, St	Good
2952......	Nov. 24	-0.5	Su, St	Good
3025......	1917 Jan. 6	-0.1	L	Good*

* One exposure only.

COMPARISON STARS

No.	Diameter (Pl. 2924)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1............	0.10	-63	$+5$	$+0.483$
2............	.16	$+11$	-54	.238
3............	.12	$+53$	$+49$	$+0.279$
Parallax star...	0.11	-13.3	$+3.3$	....

The sector has reduced the apparent brightness of the parallax star by about 6^M. The average magnitude of the comparison stars is about $10\frac{1}{2}$.

TABLE 2
REDUCTION FOR 48 ω ANDROMEDAE

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ In Arc
	mm					
1850....	+0.048	0.7	−0.61	−437	+0.008	+0″08
1890....	.036	0.8	− .90	−400	− .009	− .08
2177....	.063	0.7	+ .86	−182	− .003	− .02
2224.. .	.072	0.8	+ .68	−162	+ .004	+ .04
2367.. .	.071	0.5	− .44	− 85	− .005	− .02
2705....	.104	1.0	+ .81	+182	.000	.00
2706....	.104	1.0	+ .87	+182	.000	.00
2924....	.110	1.0	− .37	+277	− .004	− .04
2952....	.117	1.0	− .59	+292	+ .002	+ .02
3025....	+0.121	0.9	− .91	+335	+0.001	+0.01

The normal equations are:

$$8.4\ c + 3.091\ \mu - 0.260\ \pi = +0.745$$
$$63.871\ +0.630\ = +0.920$$
$$4.638\ = -0.015$$

from which

$$c = +0.085$$
$$\mu = +0.0103 = +0″110 \qquad \mu_a = +0^s0379$$
$$\pi = +0.0001 = +0″001 \pm 0″016$$

Probable error corresponding to unit weight,

$$\pm 0″035$$

The following parallaxes of this star have been published:

Flint . . . . $+0″08\ \pm0″04$
Jewdokimov . . . . $+0.10\ \pm0″09$
Mitchell . . . . $+0.023 \pm0″010$

γ Ceti (2^h38^m, $+2°49'$)

γ Ceti is of magnitude 3.6 and spectral type A. This star is also Σ 299. It has a 7^M companion, which has hardly shown relative motion since Struve, and has consequently the same proper motion as the principal star. The image of the companion is too weak for measurement on most of the plates. Boss gives the following proper motion:

$$\mu = -0^s0098 \qquad \mu' = -0″15$$

The fifteen plates for this star were measured by Mr. Van Biesbroeck.

TABLE 1
PLATES OF γ CETI

No.	Date	Hour Angle	Observers	Quality of Images
191......	1910 Jan. 8	$+0^h2$	SI	Good
2401......	1915 Dec. 23	−0.4	VB	Fair*
2720......	1916 Aug. 17	−0.4	Su, L	Good
2723......	Aug. 20	−0.1	Su, L	Good
3393......	1917 Sept. 2	+0.3	VB, Su	Fair−Good
3398......	Sept. 15	−0.1	Su, St	Fair
3404......	Sept. 16	+0.1	VB, Su	Good
3514......	1918 Jan. 13	−0.3	VB, P	Fair−Poor
3534......	Jan. 20	−0.3	P, VB	Good
3535......	Jan. 20	0.0	P, VB	Good
3549......	Jan. 31	0.0	P, VB	Poor
3563......	Feb. 3	+0.2	VB, P	Fair−Poor
3965......	Aug. 25	−0.1	VB, St	Fair
3969......	Aug. 27	+0.3	VB, St	Fair
3975......	Aug. 28	0.0	VB, St	Fair

* Only one exposure.

COMPARISON STARS

No.	Diameter (Pl. 3404)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1.............	0.11	−64	−32	+0.312
2.............	.23	+23	+ 9	.374
3.............	.15	+41	+23	+0.314
Parallax star...	0.15	+ 1.5	+ 0.6	....

The mean magnitude of the comparison stars is about $10\frac{1}{2}$. The rotating sector reduced the apparent brightness of the parallax star by about seven magnitudes.

TABLE 2
REDUCTIONS FOR γ CETI

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ In Arc
	mm					
191....	−0.020	1.0	−0.854	−2637	+0.001	+0″01
2401....	.101	0.5	− .707	− 462	+ .001	+ .01
2720....	.103	1.0	+ .939	− 224	+ .002	+ .02
2723....	.107	1.0	+ .926	− 221	− .002	− .02
3393....	.120	0.8	+ .847	+ 157	− .001	− .01
3398....	.116	0.7	+ .725	+ 170	+ .004	+ .04
3404....	.119	1.0	+ .714	+ 171	+ .001	+ .01
3514....	.131	0.6	− .884	+ 290	+ .001	+ .01
3534....	.130	1.0	− .916	+ 297	+ .002	+ .02
3535....	.133	1.0	− .916	+ 297	− .001	− .01
3549....	.128	0.4	− .938	+ 308	+ .005	+ .03
3563....	.136	0.6	− .938	+ 311	− .003	− .03
3965....	.131	0.7	+ .903	+ 514	+ .001	+ .01
3969....	.134	0.7	+ .891	+ 516	− .001	− .01
3975....	−0.132	0.7	+0.885	+ 517	+0.001	+0.01

The normal equations are:

$$11.7\ c - 7.367\ \mu + 1.133\ \pi = -1.330$$
$$810.998\ +22.936\ = -2.119$$
$$8.873\ = -0.182$$

from which:

$$c = -0.117$$
$$\mu = -0.00379 = -0″040 \quad \text{or} \quad \mu_a = -0^s0098$$
$$\pi = +0.00421 = +0″045 \pm 0″005$$

Probable error corresponding to unit weight,

$$\pm 0\overset{''}{.}015$$

Previous determinations of the parallax of γ Ceti are:

Parallax	Observers	Method
+0″119 ±0″017........	Smith	Heliometer
+0.037 ±0.008........	Mitchell	Photography

ι Persei (3ʰ2ᵐ, +49°14′)

This star, of magnitude 4.2 and spectral type G, has the following proper motion according to Boss:

$$\mu = +0\overset{s}{.}1292 \qquad \mu' = -0\overset{''}{.}080$$

The nine plates were measured by Miss Julia M. Hawkes, of Carleton College.

TABLE 1
PLATES OF ι PERSEI

No.	Date	Hour Angle	Observers	Quality of Images
176.......	1909 Dec. 30	−0ʰ4	Su, Sl	Fair
183.......	1910 Jan. 6	−0.3	Su, Sl	Good
488.......	1911 Sept. 2	−1.3	Su, Sl	Fair
630.......	1912 Jan. 8	−0.4	V, Sl	Fair
1351......	1913 Aug. 23	−0.7	Su	Good
1486......	1914 Feb. 1	−0.4	Sl	Good
1487......	Feb. 1	0.0	Sl	Good
2183......	1915 Aug. 14	−1.6	Su	Fair
2253......	Sept. 18	−0.3	Su, L	Good*

* One exposure.

COMPARISON STARS

No.	Diameter (Pl. 1487)	X (Right Ascension)	Y (Declination)	Dependence
	mm	⅓ mm	⅓ mm	
1..............	0.13	−237	−142	+0.049
2..............	.14	−249	−175	.033
3..............	.23	−256	+264	.213
4..............	.22	+188	+ 43	.231
5..............	.24	+189	+199	.296
6..............	.18	+366	−188	+0.179
Parallax star...	0.25	+ 90.6	+ 78.4	....

The average magnitude of the comparison stars is about 9½. The sector was used for reducing the apparent brightness of ι Persei by about 4ᴹ.

TABLE 2
REDUCTION FOR ι PERSEI

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	√p̄·v̄ In Arc
	⅓ mm					
176....	−0.100	0.9	−0.730	−1091	+0.012	+0″03
183....	− .128	0.9	− .799	−1084	− .023	− .06
488....	+ .710	0.7	+ .901	− 480	− .008	− .02
630....	+ .866	0.7	− .812	− 352	+ .023	+ .05
1351...	+1.668	0.9	+ .948	+ 241	+ .015	+ .04
1486...	+1.826	1.0	− .942	+ 403	+ .008	+ .02
1487...	+1.806	1.0	− .942	+ 403	− .012	− .03
2183...	+2.599	0.8	+ .071	+ 962	+ .011	+ .03
2253...	+2.601	0.7	+0.771	+ 997	−0.027	−0.06

The normal equations are:

$$7.6\,c - \quad 0.495\,\mu - \quad 1.028\,\pi = + \ \ 9.931$$
$$419.007 \ \ +21.254 \quad = +54.120$$
$$5.838 \quad = + \ \ 1.538$$

whence

$$c = +1.318$$
$$\mu = +0.1295 = +0\overset{''}{.}3445 \qquad \mu_a = +0\overset{s}{.}1282$$
$$\pi = +0.0241 = +0\overset{''}{.}064 \pm 0\overset{''}{.}015$$

Probable error corresponding to unit weight,

$$\pm 0.0125 = \pm 0\overset{''}{.}033$$

The following parallaxes for this star have been published:

Flint .... +0″05 ±0″03
Chase .... +0″106 ±0″037
Jewdokimov........ +0″176 ±0″069

B.D. 30°516 (3ʰ11ᵐ, +30°40′)

This 9ᴹ2 star, which is also Weisse-Bessel II 3ʰ167 and A.G. Leiden 1237, has according to Porter (*Publications of the Cincinnati Observatory*, No. 18, p. 43) a proper motion of

$$\mu = +0\overset{s}{.}012 \qquad \mu' = -0\overset{''}{.}24$$

or a total motion of $\mu = 0\overset{''}{.}286$ per year.

The eighteen plates of this field were measured by Mr. Van Biesbroeck.

TABLE 1
PLATES OF B.D. 30°516

No.	Date	Hour Angle	Observers	Quality of Images
575.......	1911 Dec. 5	−0ʰ5	Sl	Fair*
594.......	Dec. 18	+0.2	Su, V	Poor
1893......	1915 Jan. 2	−0.2	Su, L	Good
1914......	Jan. 17	+0.1	Su, J	Poor
2734......	1916 Aug. 22	−0.2	Su, L	Poor
2746......	Aug. 29	−0.4	Su, L	Good
2750......	Sept. 10	0.0	Su, L	Fair
3058......	1917 Jan. 18	−0.4	L	Poor
3399......	Sept. 15	+0.2	Su, St	Poor
3405......	Sept. 16	+0.1	VII, Su	Poor
3536......	1918 Jan. 20	−0.1	P, VII	Good
3537......	Jan. 20	+0.1	P, VII	Good
3564......	Feb. 2	+0.2	VII, P	Poor
3983......	Aug. 31	−0.2	VII	Poor–Fair
4002......	Sept. 18	−0.4	VII, Su	Poor
4003......	Sept. 18	0.0	VII, Su	Poor
4018......	Sept. 21	0.0	VII	Fair
4019......	Sept. 21	+0.3	VII	Good

* One exposure only.

COMPARISON STARS

No.	Diameter (Pl. 3536)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1.............	0.18	−45	−45	+0.229
2.............	.09	−27	+52	.415
3.............	.12	+24	−12	.180
4.............	.13	+48	+ 5	+0.176
Parallax star...	0.21	− 8.8	+10.1	....

No rotating sector was used on this field although the comparison stars are somewhat fainter than the parallax star. The mean magnitude of the former is about $10\frac{1}{2}$.

TABLE 2

REDUCTIONS FOR B.D. 30°516

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{\overline{p \cdot v}}$ In Arc
	mm					
575....	−0.0899	0.5	−0.365	−1864	−0.010	−0″07
594....	− .0731	0.4	− .555	−1851	+ .007	+0.05
1893....	− .0412	1.0	− .739	− 740	− .002	−0.02
1914....	− .0290	0.4	− .870	− 725	+ .010	+0.07
2734....	− .0058	0.4	+ .960	− 142	+ .007	+0.04
2746....	− .0092	1.0	+ .934	− 135	+ .003	+0.03
2750....	− .0156	0.7	+ .857	− 118	− .004	−0.03
3058....	− .0162	0.4	− .879	+ 7	− .003	−0.02
3399....	+ .0065	0.4	+ .817	+ 247	+ .005	+0.03
3405....	+ .0007	0.4	+ .804	+ 248	− .001	−0.01
3536....	+ .0036	1.0	− .890	+ 378	+ .002	+0.02
3537....	+ .0034	1.0	− .890	+ 378	+ .002	+0.02
3564....	− .0030	0.4	− .945	+ 388	+ .005	+0.03
3983....	+ .0165	0.6	+ .926	+ 597	+ .002	+0.01
4002....	+ .0170	0.4	+ .791	+ 615	+ .002	+0.01
4003....	+ .0135	0.4	+ .791	+ 615	− .002	−0.01
4018....	+ .0085	0.7	+ .761	+ 618	− .007	−0.06
4019....	+0.0145	1.0	+0.761	+ 618	−0.001	−0.01

Normal equations:

$$11.1\, c+\quad 0.360\, \mu+\quad 1.047\, \pi = -0.1046$$
$$546.232\quad +21.578\quad = +2.0856$$
$$7.569\quad = +0.0903$$

whence

$$c = -0.0098$$
$$\mu = +0.003718 = +0″0396 \text{ or } \mu_a = +0^s0112$$
$$\pi = +0.00269\quad = +0^s029 \pm 0″010$$

Probable error corresponding to unit weight,

$$\pm 0″027$$

A. G. Berlin B 1231 (3^h46^m, $+22°23'$)

This 7^M7 star is B.D. 22°583. It is also Lalande 7116–17. Porter gives the proper motion (*Publications of the Cincinnati Observatory*, No. 18, p. 13)

$$\mu = +0^s0139 \qquad\qquad \mu' = -0″337$$

The eleven plates of this star were measured by Mr. Van Biesbroeck.

TABLE 1

PLATES OF A.G. BERLIN B 1231

No.	Date	Hour Angle	Observers	Quality of Images
1880......	1914 Dec. 19	−0^{h}1	Su, L	Fair
1894......	1915 Jan. 2	−0.2	Su, L	Fair–Poor
3417......	1917 Sept. 23	+0.3	VB, Su	Good
3428......	Sept. 30	−0.1	VB, Su	Good
3538......	1918 Jan. 20	0.0	P, VB	Good
3573......	Feb. 6	+0.3	P, VB	Good
4033......	Sept. 22	+0.1	VB, Su	Fair
4060......	Sept. 26	+0.2	VB	Good–Fair
4070......	Sept. 29	+0.1	VB, Su	Fair
4303......	1919 Jan. 26	−0.2	HP, VB	Good
4304......	Jan. 26	+0.3	HP	Good

COMPARISON STARS

No.	Diameter (Pl. 4303)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1..:.........	0.15	−63.4	+69.5	+0.218
2.............	.24	+63.5	+ 6.9	.189
3.............	.15	− 4.7	−23.1	.189
4.............	.10	+52.2	+17.0	.219
5.............	.16	+79.4	−70.3	0.185
Parallax star...	0.14	− 0.6	+ 2.8	....

The mean magnitude of the comparison stars is about 11. A reduction of about 3^M in the apparent brightness of the parallax star was obtained by means of the rotating sector.

TABLE 2

REDUCTIONS FOR A.G. BERLIN B 1231

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{\overline{p \cdot v}}$ in Arc
	mm					
1880....	−0.019	0.7	−0.458	−1040	−0.005	−0″04
1894....	− .010	0.6	− .650	−1026	+ .004	+ .03
3417....	+ .039	1.0	+ .832	− 31	.000	.00
3428....	+ .036	1.0	+ .763	− 24	− .003	− .03
3538....	+ .042	1.0	− .841	+ 88	+ .003	+ .03
3573....	+ .041	1.0	− .942	+ 105	+ .001	+ .01
4033....	+ .058	0.7	+ .844	+ 333	+ .001	+ .01
4060....	+ .058	0.8	+ .807	+ 337	+ .001	+ .01
4070....	+ .061	0.7	+ .777	+ 340	+ .003	+ .03
4303....	+ .056	1.0	− .885	+ 459	− .001	− .01
4304....	+0.057	1.0	−0.885	+ 459	0.000	0.00

The normal equations are:

$$9.5\, c+\quad 4.531\, \mu-0.888\, \pi = +0.382$$
$$207.980\quad +3.033\quad = +1.193$$
$$6.278\quad = +0.001$$

from these:

$$c = +0.038$$
$$\mu = +0.004859 = +0″052 \qquad \mu_a = +0^s0136$$
$$\pi = +0.00326\quad = +0″035 \pm 0″008$$

Probable error corresponding to unit weight,

$$\pm 0″019$$

No other determinations of the parallax of this star are available.

B.D. +75°154 (3^h48^m, $+75°53'$)

This 8.2 magnitude star is Groombridge 745. Boss gives a proper motion of $+0".1009$, $-0".530$. The 14 plates were measured by Mrs. Pettit.

TABLE 1
PLATES OF B.D. +75°154

No.	Date	Hour Angle	Observers	Quality of Images
3026.......	1917 Jan. 6	-0^h8	Su, St	Good
3395.......	Sept. 8	$+0.1$	Su, St	Fair*
3400.......	Sept. 15	$+0.1$	Su, St	Good
3406.......	Sept. 16	-0.2	VB, Su	Good
3539.......	1918 Jan. 20	$+0.5$	P, VB	Good
3551.......	Jan. 31	-0.1	VB, P	Good*
3552.......	Jan. 31	$+0.2$	P, VB	Poor
3565.......	Feb. 3	-0.1	VB, P	Good
4020.......	Sept. 21	0.0	VB, Su	Good
4045.......	Sept. 25	0.0	VB, Su	Fair
4074.......	Oct. 2	$+0.1$	VB, Su	Good
4080.......	Oct. 6	$+0.1$	VB, Su.	Fair*
4266.......	1919 Jan. 10	$+0.2$	P, HP	Good
4284.......	Jan. 16	$+0.2$	VB	Poor*

* One exposure only.

COMPARISON STARS

No.	Diameter (Pl. 3400)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1.............	0.21	-54	-59	$+0.172$
2.............	.25	-51	-13	.203
3.............	.32	$+10$	$+60$	.303
4.............	.22	$+95$	$+3$	$+0.322$
Parallax star...	0.20	$+13.9$	$+9.1$	....

The mean magnitude of the comparison stars is about 10. The rotating sector was used for reducing the apparent brightness by about 2^M.

TABLE 2
REDUCTIONS FOR B.D. +75°154

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	mm					
3026....	-0.068	0.9	-0.70	-443	$+0.003$	$+0".03$
3395....	.046	0.5	$+.94$	-229	$+.001$	$+.01$
3400....	.050	1.0	$+.90$	-222	$-.004$	$-.04$
3406....	.046	1.0	$+.89$	-221	$.000$	$.00$
3539....	.042	0.8	$-.84$	-64	$.000$	$.00$
3551....	.042	0.7	$-.91$	-53	$-.001$	$-.01$
3552....	.043	0.3	$-.91$	-53	$-.003$	$-.02$
3565....	.039	0.7	$-.93$	-50	$+.001$	$+.01$
4020....	.012	1.0	$+.86$	$+180$	$+.001$	$+.01$
4045....	.012	0.7	$+.82$	$+184$	$+.001$	$+.01$
4074....	.010	0.8	$+.75$	$+191$	$+.003$	$+.03$
4080....	.016	0.5	$+.70$	$+195$	$-.003$	$-.02$
4266....	.013	1.0	$-.74$	$+291$	$-.002$	$-.02$
4284....	-0.013	0.4	-0.81	$+297$	-0.001	-0.01

The normal equations are:

$$10.3\,c - 1.265\,\mu + 0.717\,\pi = -0.337$$
$$53.305 + 0.307 = +0.475$$
$$7.198 = +0.012$$

from which

$$c = -0.032$$
$$\mu = +0.0081 = +0".087 \qquad \mu_a = +0".0868$$
$$\pi = +0.0045 = +0".048 \pm 0".006$$

Probable error corresponding to unit weight,

$$\pm 0.0014 = \pm 0".015$$

The following values have been obtained:
$+0".044 \pm 0".038$ by Chase with the heliometer.
$+0".083 \pm 0".024$ by Kapteyn by photography (*Publications of the Astronomical Laboratory*, Groningen, Vol. X, pp. 46–47).

α Tauri (Aldebaran) (4^h30^m, $+16°18'$)

This first-magnitude star, of spectral type K 5, has according to Boss a proper motion of:

$$\mu = +0".0048 \qquad \mu' = -0".191$$

The nineteen plates of this series were measured by Mr. Van Biesbroeck.

TABLE 1
PLATES OF α TAURI

No.	Date	Hour Angle	Observers	Quality of Images
2752.......	1916 Sept. 10	-0^h2	St, Su	Poor
2755.......	Sept. 19	-0.2	Su	Poor
3418.......	1917 Sept. 23	$+0.2$	St, L	Poor
3419.......	Sept. 23	$+0.5$	VB, Su	Fair*
3516.......	1918 Jan. 3	0.0	VB, Su	Fair–Poor
3540.......	Jan. 20	$+0.4$	VB, Su	Fair–Poor
3553.......	Jan. 31	$+0.1$	VB	Poor
3566.......	Feb. 3	-0.2	VB, P	Poor
3574.......	Feb. 6	$+0.1$	P, VB	Good
3586.......	Feb. 17	-0.4	P, VB	Poor–Fair
3587.......	Feb. 17	0.0	P, VB	Fair
3597.......	Feb. 24	$+0.1$	P, VB	Good
4021.......	Sept. 21	-0.2	VB	Poor
4022.......	Sept. 21	$+0.2$	VB	Poor
4034.......	Sept. 22	-0.1	VB	Poor
4046.......	Sept. 25	-0.2	VB	Fair–Poor
4047.......	Sept. 25	$+0.1$	VB	Fair
4061.......	Sept. 26	-0.1	VB	Good–Fair
4390.......	1919 Feb. 16	$+0.2$	VB, P	Fair

* One exposure only.

COMPARISON STARS

No.	Diameter	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1.............	0.12	-71.5	-10.3	$+0.321$
2.............	.13	-14.1	-28.9	.250
3.............	.21	$+41.1$	-57.2	.177
4.............	.22	$+44.5$	$+96.4$	$+0.252$
Parallax star...	0.15	-8.1	$+3.7$	....

The mean magnitude of comparison stars is about 10. The apparent brightness of the parallax star was reduced about 9^M by means of the double rotating sector.

TABLE 2

REDUCTIONS FOR α TAURI

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p} \cdot v$ In Arc
	mm					.
2752....	+0.027	0.4	+0.983	−499	+0.006	+0ʺ04
2755....	13	0.4	+ .946	−490	− .008	− .05
3418....	38	0.5	+ .923	−121	+ .008	+ .06
3419....	22	0.5	+ .923	−121	− .008	− .06
3516....	21	0.6	− .671	− 9	− .005	− .04
3540....	27	0.6	− .754	− 2	+ .001	+ .01
3553....	19	0.4	− .859	+ 9	− .006	− .04
3566....	24	0.5	− .883	+ 12	− .001	− .01
3574....	26	1.0	− .904	+ 15	+ .001	+ .01
3586....	23	0.6	− .960	+ 26	− .003	− .02
3587....	38	0.4	− .960	+ 26	+ .012	+ .08
3597....	32	1.0	− .976	+ 33	+ .006	+ .06
4021....	43	0.4	+ .937	+242	+ .004	+ .03
4022....	40	0.4	+ .937	+242	+ .001	.00
4034....	49	0.4	+ .932	+243	+ .010	+ .07
4046....	40	0.6	+ .912	+246	+ .001	+ .01
4047....	35	0.7	+ .912	+246	− .004	− .04
4061....	39	0.9	+ .905	+247	.000	.00
4390....	+0.029	0.7	−0.950	+392	−0.006	−0.05

The normal equations are:

$$11.0\,c + 6.677\,\mu - 0.328\,\pi = +0.339$$
$$52.405 \quad -0.638 \quad = +0.324$$
$$9.085 \quad = +0.029$$

from which

$$c = +0.029$$
$$\mu = +0.00248 = +0ʺ0266 \qquad \mu_\alpha = +0^s0067$$
$$\pi = +0.0044 = +0ʺ047 \pm 0ʺ010$$

Probable error corresponding to unit weight,

$$\pm 0ʺ032$$

Not considering the older determinations from micrometric measures by O. Struve and A. Hall, the modern values found for the parallax of α Tauri are:

Parallax	Observer	Method
+0ʺ109 ±0ʺ014....	Elkin	Heliometer
+0.079 ±0.029....	Kapteyn	Photography(Helsingfors)
−0.005 ±0.020....	Kuestner	Photography (Bonn)
+0.032 ±0.084....	Jewdokimov	Meridian Circle
+0.091	Adams	Spectrum

β Tauri (5ʰ20ᵐ, +28°31′)

This 1ᴹ8 star is of spectral type B 8. Boss gives the following proper motion:

$$\mu = +0^s024 \qquad \mu' = -0ʺ177$$

The fifteen plates of this field were measured by Mr. Van Biesbroeck.

TABLE 1

PLATES OF β TAURI

No.	Date	Hour Angle	Observers	Quality of Images
2821......	1916 Oct. 5	+0ʰ1	Su, L	Poor
2851......	Oct. 9	+0.1	Su, St	Fair
2876......	Oct. 25	+0.3	Su, St	Fair
3029......	1917 Jan. 6	−0.2	Su, St	Good
3062......	Jan. 18	−0.1	L	Fair
3078......	Feb. 8	+0.1	Su, L	Poor*
3568......	1918 Feb. 3	0.0	VB, Su	Poor*
3576......	Feb. 6	+0.2	P	Good
3580......	Feb. 7	0.0	Su, P	Poor*
3618......	Mar. 7	+0.1	P	Good
4049......	Sept. 25	+0.2	Su, VB	Poor
4064......	Sept. 26	+0.1	VB	Good
4094......	Oct. 9	+0.2	VB	Fair
4098......	Oct. 12	+0.2	VB	Fair
4392......	1919 Feb. 16	+0.2	VB	Fair

* One exposure only.

COMPARISON STARS

No.	Diameter (Pl. 2876)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1.............	0.12	−72.0	+55.4	+0.167
2.............	.11	−51.7	−49.4	.157
3.............	.13	− 6.3	−65.7	.182
4.............	.15	+55.2	+21.3	.239
5.............	.16	+74.8	+38.4	+0.255
Parallax star...	0.14	+11.0	+ 4.3	....

The mean magnitude of the comparison stars is about 10. The double rotating sector reduced the apparent brightness of β Tauri by about eight magnitudes.

TABLE 2

REDUCTIONS FOR β TAURI

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p} \cdot v$ in Arc
	mm					
2821....	−0.003	0.4	+0.926	−407	−0.007	−0ʺ05
2851....	+ .004	0.7	+ .897	−403	.000	.00
2876....	+ .003	0.7	+ .742	−387	− .001	− .01
3029....	+ .006	1.0	− .419	−314	+ .002	+ .02
3062....	+ .006	0.7	− .597	−302	+ .002	+ .02
3078....	− .005	0.3	− .842	−281	− .009	− .05
3568....	− .010	0.3	− .790	+ 79	− .015	− .09
3576....	+ .006	1.0	− .820	+ 82	+ .001	+ .01
3580....	+ .003	0.3	− .830	+ 83	− .002	− .01
3618....	+ .011	1.0	− .987	+111	+ .006	+ .06
4049....	+ .005	0.4	+ .980	+313	− .001	− .01
4064....	+ .012	1.0	+ .976	+314	+ .006	+ .06
4094....	+ .007	0.7	+ .901	+327	+ .001	+ .01
4098....	+ .002	0.7	+ .877	+330	− .004	− .04
4392....	−0.001	0.7	−0.903	+457	−0.007	−0.06

The normal equations are:

$$9.9\,c + 1.348\,\mu + 0.118\,\pi = +0.046$$
$$92.891 \quad +0.574 \quad = +0.036$$
$$6.980 \quad = +0.004$$

from which

$$c = +0.0047$$
$$\mu = +0.000324 = +0ʺ0035 \qquad \mu_\alpha = +0^s0010$$
$$\pi = +0.00043 = +0ʺ005 \pm 0ʺ011$$

Probable error corresponding to unit weight,

$$\pm 0\rlap{.}''031$$

Older determinations by Pritchard give $+0\rlap{.}''073$ and $+0\rlap{.}''053$ and from meridian observations Flint (*Astronomical Journal*, Vol. XXVII [1912], p. 49) deduces $-0\rlap{.}''065 \pm 0\rlap{.}''028$.

δ Aurigae (5^h51^m, $54°17'$)

This 3^M9 star of spectral class K has, according to Boss's *Preliminary General Catalogue*, the following proper motion:

$$\mu = +0\rlap{.}''0098 \qquad \mu' = -0\rlap{.}''126$$

The twelve plates of this field were measured by Mr. Pettit.

TABLE 1
PLATES FOR δ AURIGAE

No.	Date		Hour Angle	Observers	Quality of Images
1116	1913	Feb. 8	-0^h1	Su, M	Good
1126		Feb. 9	$+0.1$	Su, Sl	Good
1411		Oct. 25	$+0.1$	Sl, Sl	Fair–Poor
1780	1914	Nov. 1	-0.2	Su, L	Good
2808	1916	Sept. 30	-0.2	St, L	Fair–Poor
2822		Oct. 5	$+0.1$	Su, L	Good–Fair
2874		Oct. 17	$+0.1$	Su, L	Poor
3091	1917	Feb. 11	-0.3	Su, L	Good
3129		Mar. 3	-0.2	L	Good
3431		Sept. 30	-0.2	VB, Su	Good–Fair
3599	1918	Feb. 24	-0.2	P, VB	Good–Fair
3614		Mar. 3	0.0	P, VB	Good–Fair

COMPARISON STARS

No.	Diameter (Pl. 3129)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1	0.12	$+80.6$	-63.3	$+0.391$
2	.17	$+40.3$	$+53.6$	.273
3	.22	-70.2	$+51.0$	.130
4	.23	-50.7	-41.3	$+0.206$
Parallax star	0.19	$+22.6$	-11.8	....

The mean magnitude of the comparison stars is about $10\frac{1}{2}$. The rotating sector was used for reducing the brightness of δ Aurigae by about 7^M.

TABLE 2
REDUCTIONS FOR δ AURIGAE

No.	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p} \cdot v$ in Arc
	mm					
1116	-0.330	1.0	-0.76	-1103	-0.005	$-0\rlap{.}''05$
1126	.326	1.0	-0.78	-1102	$-$ .001	$-$ .01
1411	.307	0.5	$+0.82$	$-$ 844	$+$ .009	$+$ .06
1780	.305	1.0	$+$ .74	$-$ 472	$+$ .002	$+$ .02
2808	.284	0.5	$+$ .99	$+$ 227	$+$ .003	$+$ .02
2822	.286	0.9	$+$ .96	$+$ 232	$+$ .001	$+$ .01
2874	.278	0.4	$+$ .90	$+$ 244	$+$ .009	$+$ .04
3091	.286	1.0	$-$ .81	$+$ 361	.000	.00
3129	.284	1.0	$-$ .96	$+$ 381	$+$ .003	$+$ .03
3431	.288	0.9	$+$ .99	$+$ 592	$-$ .011	$-$ .11
3599	.276	0.9	$-$ .91	$+$ 739	$+$ .001	$+$ .01
3614	-0.276	0.9	-0.96	$+$ 746	$+0.001$	$+0.01$

Normal equations:

$$10.0\, c - 0.678\, \mu - 1.233\, \pi = -2.950$$
$$469.123 \quad +0.228 \quad = +1.442$$
$$7.747 \quad = +0.377$$

hence

$$c = -0.2946$$
$$\mu = +0.00265 = +0\rlap{.}''0282 \quad \mu_a = +0\rlap{.}''0118$$
$$\pi = +0.00170 = +0\rlap{.}''018 \pm 0\rlap{.}''013$$

Probable error corresponding to unit weight,

$$\pm 0\rlap{.}''036$$

The previous determinations are:

Parallax	Observer	Method
$+0\rlap{.}''107 \pm\ ''033$	Abetti	Meridian Circle
$-0.015 \pm\ .008$	Mitchell	Photography
$+0.023$	Adams	Spectrum
$+0.035 \pm 0.041$	Jost	Meridian Circle

B.D. 26°1067 (6^h0^m, $+26°34'$)

This 8^M9 star is also A.G. Cambridge (England) 2935. In comparing in the stereo-comparator two plates taken at an interval of thirteen years, Wolf (*Astronomische Nachrichten*, Vol. CLXXI [1906], p. 327) found that this star has a proper motion of $0\rlap{.}''54$ in position angle 227°. The fourteen plates for this star were measured by Mr. Van Biesbroeck. In measuring the first and last plate of this series in declination, the proper motion in declination was found to be $-0\rlap{.}''405$. The resulting proper motion would be $0\rlap{.}''45$ in 205°.

TABLE 1
PLATES OF B.D. 26°1067

No.	Date		Hour Angle	Observers	Quality of Images
1749	1914	Oct. 24	0^h0	Su, L	Good
1781		Nov. 1	$+0.2$	Su, L	Good
1801		Nov. 5	$+0.1$	Su, L	Good
1949	1915	Feb. 25	-0.1	J, Su	Good–Poor
1964		Feb. 28	-0.1	J	Good
3063	1917	Jan. 18	-0.3	L	Fair*
3092		Feb. 11	0.0	Su, L	Fair*
4082	1918	Oct. 8	$+0.1$	VB	Fair
4101		Oct. 13	$+0.3$	VB	Poor
4141		Nov. 12	0.0	HP	Good–Fair
4142		Nov. 12	$+0.3$	HP	Good
4423	1919	Mar. 6	-0.2	VB	Good
4424		Mar. 6	$+0.1$	VB	Good
4429		Mar. 9	$+0.2$	VB, P	Good

* One exposure only.

COMPARISON STARS

No.	Diameter (Pl. 1964)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1	0.16	-23.3	$+14.5$	$+0.120$
2	.19	$+ 2.0$	$+ 2.2$	.363
3	.18	$+ 4.6$	$+25.8$	.396
4	.14	$+16.7$	$+30.1$	$+0.121$
Parallax star	0.20	$+ 1.8$	-58.1	....

The mean magnitude of the comparison stars is about $9\frac{1}{2}$. No rotating sector was used on the parallax star.

TABLE 2
REDUCTIONS FOR B.D. 26°1067

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p} \cdot \bar{v}$ in Arc
	mm			°		
1749....	−0.017	1.0	+0.852	−898	+0.001	+0.01
1781....	.019	1.0	+ .782	−890	.000	.00
1801....	.019	1.0	+ .725	−886	.000	.00
1949....	.024	0.7	− .907	−774	− .001	− .01
1964....	.030	1.0	− .927	−771	− .004	− .04
3063....	.054	0.5	− .466	− 81	+ .005	+ .04
3092....	.062	0.5	− .785	− 57	− .002	− .02
4082....	.089	0.7	+ .964	+547	− .002	− .02
4101....	.094	0.4	+ .936	+552	− .007	− .05
4141....	.087	0.8	+ .636	+582	+ .002	+ .02
4142....	.087	1.0	+ .636	+582	+ .002	+ .02
4423....	.097	1.0	− .955	+696	− .001	− .01
4424....	.098	1.0	− .955	+696	− .002	− .02
4429....	−0.096	1.0	−0.971	+699	0.000	0.00

The normal equations are:

$$11.6\,c - 3.135\,\mu - 0.516\,\pi = -0.708$$
$$580.066 - 16.222 = -2.597$$
$$8.213 = +0.122$$

from which:

$$c = -0.062$$
$$\mu = -0.00477 = 0''051 \quad \mu_a = -0^s0138$$
$$\pi = +0.00142 = +0''015 \pm 0''006$$

Probable error corresponding to unit weight,

$$\pm 0''018$$

No other determinations of the value of the parallax of this star have been published.

B.D. +25°1188 (Oxford ph. 25°21321)
(6^h10^m, +25°15′)

This 9^M2 star, which is also A.G. Cambridge (England) 3090, was found to have a proper motion of $\mu = 0''42$ from the comparison of photographic plates taken at Oxford (*Monthly Notices of the Royal Astronomical Society*, Vol. LXXII [1911], p. 71).

The ten plates of this star were measured by Mr. Van Biesbroeck.

TABLE 1
PLATES OF B.D. 25°1188

No.	Date	Hour Angle	Observers	Quality of Images
1413.......	1913 Oct. 26	−0ʰ3	Sl	Fair
1427.......	Nov. 1	+0.4	Su, Sl	Good–Fair
1498.......	1914 Feb. 15	−0.5	Su, Sl	Good–Fair
1511.......	Mar. 1	0.0	Su, Sl	Fair
1708.......	Oct. 10	−0.3	Su, L	Fair
2877.......	1916 Oct. 25	0.0	Su, St	Good–Fair
3114.......	1917 Feb. 17	0.0	Su, St	Good
3130.......	Mar. 3	0.0	St, Su	Fair
3470.......	Nov. 18	+0.1	Su, VB	Fair
3494.......	Dec. 9	+0.5	VB	Good

COMPARISON STARS

No.	Diameter (Pl. 3130)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1.............	0.13	+41.1	−55.6	+0.187
2.............	.12	+40.7	+11.4	0.167
3.............	.11	−37.1	+51.6	0.211
4.............	.15	−12.9	+ 3.2	0.208
5.............	.19	−31.8	−10.6	+0.227
Parallax star...	0.24	− 3.23	+ 0.64	....

The mean magnitude of the comparison stars is about $10\frac{1}{2}$. No rotating sector was used on this field.

TABLE 2
REDUCTIONS FOR B.D. 25°1188

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p} \cdot \bar{v}$ in Arc
	mm					
1413....	+0.0035	0.7	+0.854	−711	+0.0028	+0.02
1427....	+ 10	0.8	+ .794	−705	+ .0005	.00
1498....	− 32	0.8	− .799	−599	+ .0013	+ .01
1511....	− 91	0.7	− .920	−585	− .0043	− .04
1708....	+ 55	0.7	+ .965	−362	− .0025	− .02
2877....	+ 245	0.8	+ .861	+384	+ .0022	+ .02
3114....	+ 212	1.0	− .822	+496	+ .0042	+ .04
3130....	+ 132	0.7	− .933	+513	− .0036	− .03
3470....	+ 280	0.7	+ .583	+772	− .0006	− .01
3494....	+0.0260	1.0	+0.254	+794	−0.0016	−0.02

The normal equations are:

$$7.9\,c + 2.929\,\mu + 0.501\,\pi = +0.0938$$
$$296.56 - 3.193 = +0.6012$$
$$4.950 = +0.0212$$

hence

$$c = 0.0109$$
$$\mu = 0.00197 = +0''0210 \quad \mu_a = +0^s00564$$
$$\pi = 0.00446 = +0''048 \pm 0''009$$

Probable error corresponding to unit weight,

$$\pm 0''020$$

No other determinations of the parallax have been published.

α Geminorum (Castor) (7^h28^m, +32°6′)

This brilliant double star has two A-type components of magnitude 2.0 and 2.9, each one of them being a spectroscopic binary, with periods of 9.2 and 2.9 days respectively. The period of the large system has been uncertain for a long time but recent observations show that it is about 350 years. Assuming that the two visual components have the

same mass, Boss finds the following proper motion for the center of gravity of the system:

$$\mu = -0\overset{s}{.}0135 \qquad\qquad \mu' = -0\overset{\prime\prime}{.}110$$

The seventeen plates of this field were measured by Mr. Van Biesbroeck.

TABLE 1

PLATES OF α GEMINORUM

No.	Date	Hour Angle	Observers	Quality of Images
2482......	1916 Mar. 16	$-0\overset{h}{.}4$	VB	Good
2495......	Mar. 30	-0.1	VB	Fair
2881......	Oct. 29	-0.3	Su, L	Good
2897......	Nov. 1	-0.3	Su, St	Fair
2909......	Nov. 3	-0.2	Su, L	Good
2931......	Nov. 17	-0.5	Su, L	Fair
3094......	1917 Feb. 11	-0.4	Su, L	Good
3617......	1918 Mar. 3	-0.2	Su, VB	Fair–Poor
3636......	Mar. 10	0.0	VB	Good*
3676......	Mar. 28	$+0.1$	P, VB	Good
4137......	Nov. 10	-0.2	HP	Poor
4167......	Nov. 13	0.0	VB	Fair
4181......	Nov. 23	0.0	VB	Good
4198......	Nov. 26	-0.2	HP	Good
4396......	1919 Feb. 19	-0.3	HP	Good
4425......	Mar. 6	-0.4	VB	Good
4431......	Mar. 9	-0.1	VB	Good

* One exposure only.

COMPARISON STARS

No.	DIAMETER (Pl.4396)	X (RIGHT ASCENSION)	Y (DECLINATION)	DEPENDENCES		
				A	B	Adopted
	mm	¼ mm	¼ mm			
1.........	0.18	-361	-215	$+0.171$	$+0.173$	$+0.172$
2.........	.11	-212	-100	.186	.187	.187
3.........	.16	$- 33$	$+ 40$	.207	.205	.206
4.........	.11	$+151$	$+240$	.236	.232	.234
5.........	.13	$+455$	$+ 41$	$+0.200$	$+0.202$	$+0.201$
Parallax star A...	.16	$+ 18.8$	$+ 16.6$	....	....	....
Parallax star B...	0.09	$+ 17.7$	$+ 15.0$	....	....	....

The mean magnitude of the comparison stars is about 10. The double rotating sector was used for reducing the apparent brightness by 7^{M}.

TABLE 2

REDUCTIONS FOR α GEMINORUM

PLATE	SOLUTION (m) ¼ mm		WEIGHT (p)	PARALLAX FACTOR (P)	TIME IN DAYS (t)	$\sqrt{p \cdot v}$ IN ARC	
	A	B				A	B
2482..	$+0.628$	-0.559	1.0	-0.895	-624	$-0\overset{\prime\prime}{.}04$	$-0\overset{\prime\prime}{.}03$
2495..	.631	.539	0.7	$- .971$	-610	$- .01$	$+ .02$
2881..	.654	.566	1.0	$+ .943$	-397	$+ .05$	$- .06$
2897..	.625	.563	0.7	$+ .927$	-394	$- .02$	$- .04$
2909..	.654	.512	1.0	$+ .914$	-392	$+ .05$	$+ .09$
2931..	.617	.561	0.7	$+ .781$	-378	$- .03$	$+ .02$
3094..	.565	.597	1.0	$- .534$	-292	$- .03$	$- .02$
3617..	.477	.050	0.5	$- .774$	$+ 93$	$- .02$	$+ .01$
3636..	.480	.632	0.7	$- .843$	$+100$	$.00$	$+ .05$
3676..	.505	.665	1.0	$- .061$	$+118$	$+ .07$	$- .01$
4137..	.469	.656	0.4	$+ .868$	$+345$	$.00$	$+ .03$
4167..	.470	.636	0.7	$+ .842$	$+348$	$.00$	$+ .08$
4181..	.453	.688	1.0	$+ .741$	$+358$	$- .03$	$- .06$
4198..	.448	.672	1.0	$+ .706$	$+361$	$- .04$	$+ .01$
4396..	.411	.702	1.0	$- .625$	$+446$	$.00$	$+ .01$
4425..	.409	.718	1.0	$- .802$	$+461$	$+ .01$	$+ .02$
4431..	$+0.411$	-0.718	1.0	-0.831	$+464$	$+0.02$	-0.01

The normal equations are:

$$\begin{array}{rrrcrr} & & & & A & B \\ 14.4\,c+ & 0.337\,\mu & -0.869\,\pi & =+7.542, & -9.025 \\ & 229.791 & -4.635 & =-4.970, & -3.860 \\ & & 9.789 & =-0.123, & +0.811 \end{array}$$

from which

A

$$c = +0.526$$
$$\mu = -0.02192 = -0\overset{\prime\prime}{.}0584 \qquad \mu_a = -0\overset{\prime\prime}{.}0167$$
$$\pi = +0.0238 \ = +0\overset{\prime\prime}{.}063 \pm 0\overset{\prime\prime}{.}008$$

B

$$c = -0.625$$
$$\mu = -0.01548 = -0\overset{\prime\prime}{.}0412 \qquad \mu_a = -0\overset{\prime\prime}{.}0118$$
$$\pi = +0.0200 \ = +0\overset{\prime\prime}{.}053 \pm 0\overset{\prime\prime}{.}010$$

Probable error corresponding to unit weight:

$$\text{For A,} \ \pm 0\overset{\prime\prime}{.}025$$
$$\text{For B,} \ \pm 0.031$$

The resulting parallax of the system is:

$$\pi = +0\overset{\prime\prime}{.}059 \pm 0\overset{\prime\prime}{.}006$$

Other recent determinations of the parallax of Castor are:

Parallax	Observer	Method
$+0\overset{\prime\prime}{.}17 \ \pm 0\overset{\prime\prime}{.}031$........	Flint	Meridian Circle
$+0.022 \pm 0.010$........	Smith	Heliometer
$+0.102 \pm 0.028$........	Russell	Photography
$+0.100$..............	Adams	Spectrum

By combining the relative radial velocity with the motion computed from Doberck's elements (*Astronomische Nachrichten*, Vol. CLXVI [1904], p. 145) H. D. Curtis finds (*Lick Observatory Bulletin*, Vol. IV [1906], p. 55) a parallax of 0ʺ.05. Assuming for each spectroscopic system an inclination of 63°, the same as that given by Doberck for the visual system, Curtis computes that the mass of the fainter component should be six times that of the brighter component. None of the comparison stars used in the present investigation show an appreciable proper motion. The values of the proper motion given here should consequently be nearly absolute. Furthermore, the proper motion of the center of gravity given by Boss, on the assumption that the two components have the same mass, must be very close to the truth and almost independent of that assumption on account of the long interval covered by the meridian observations.

The different proper motions are:

Measured value for bright component (A) $= -0.0167$
Measured value for faint component (B) $= -0.0118$
Value given by Boss for center of gravity $= -0.0135$

Consequently the proper motions relatively to the center of gravity are:

For A, -0.0032
For B, $+0.0017$

This gives for the mass ratio:

$$\frac{B}{A} = \frac{0.0032}{0.0017} = 1.9$$

The predominance of mass of the faint companion is well marked, although not quite so strongly as indicated by the hypothetical value of Curtis.

α Canis Minoris (Procyon) $(7^h34^m, +5°29')$

This bright star, magnitude 0^M5, of spectral type F 5, is a binary system with a period of 39 years. The curvature of the orbit of the bright component of the system is less than 0.1 during the interval of two years covered by the plates and has been disregarded in the solution. In the *Preliminary General Catalogue*, Boss gives the following proper motion for the center of gravity of the system:

$$\mu = -0.0466 \qquad \mu' = -1.030$$

The fifteen plates used here were measured by Mr. Van Biesbroeck.

TABLE 1

PLATES OF α CANIS MINORIS

No.	Date	Hour Angle	Observers	Quality of Images
3125.......	1917 Mar. 1	-0^h1	Su, L	Good
3473.......	Nov. 18	$+0.2$	VB, Su	Fair
3474.......	Nov. 18	$+0.4$	VB, Su	Fair
3601.......	1918 Feb. 24	-0.1	VB	Fair–Good
3621.......	Mar. 7	-0.3	Su, P	Fair
3653.......	Mar. 24	-0.1	P, VB	Good
3654.......	Mar. 24	$+0.1$	P, VB	Good
3677.......	Mar. 28	$+0.5$	P, VB	Good
4115.......	Oct. 20	0.0	HP	Fair
4145.......	Nov. 12	$+0.1$	HP	Fair
4168.......	Nov. 13	$+0.2$	VB	Fair
4199.......	Nov. 26	$+0.1$	HP	Fair
4362.......	1919 Feb. 6	-0.4	VB	Good
4426.......	Mar. 6	$+0.1$	VB	Fair
4432.......	Mar. 9	$+0.2$	VB	Good

COMPARISON STARS

No.	Diameter (Pl. 3677)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1............	0.16	-68.1	$+ 1.9$	$+0.234$
2............	.10	-45.9	$+67.0$	.173
3............	.13	$+ 3.8$	-38.1	.227
4............	.13	$+47.6$	$- 6.5$	.180
5............	.25	$+62.6$	-24.3	$+0.186$
Parallax star...	0.23	$- 2.8$	$- 2.2$	....

The apparent brightness of the parallax star was reduced by about 10 magnitudes by means of the double occulting disk; the mean magnitude of the comparison stars is about 10.

TABLE 2

REDUCTIONS FOR α CANIS MINORIS

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	mm					
3125....	-0.130	1.0	-0.739	-472	-0.004	-0.04
3473....	.126	0.7	$+0.804$	-210	$+ .002$	$+ .02$
3474....	.123	0.7	$+0.803$	-210	$+ .005$	$+ .04$
3601....	.190	0.8	-0.675	-112	$- .003$	$- .03$
3621....	.199	0.7	-0.800	-101	$- .006$	$- .05$
3653....	.198	1.0	-0.934	$- 84$	$+ .002$	$+ .02$
3654....	.196	1.0	-0.935	$- 84$	$+ .004$	$+ .04$
3677....	.203	1.0	-0.955	$- 80$	$- .002$	$- .02$
4115....	.188	0.7	$+0.978$	$+126$	$- .006$	$- .05$
4145....	.188	0.7	$+0.860$	$+149$	$+ .001$	$+ .01$
4168....	.195	0.7	$+0.852$	$+151$	$- .005$	$- .04$
4199....	.194	0.7	$+0.720$	$+163$	$+ .002$	$+ .02$
4362....	.243	1.0	-0.417	$+235$	$- .002$	$- .02$
4426....	.256	0.7	-0.788	$+263$	$+ .001$	$+ .01$
4432....	-0.258	1.0	-0.817	$+266$	$+0.001$	$+0.01$

The normal equations are:

$$12.4\, c - 0.769\, \mu - 2.936\, \pi = -2.409$$
$$55.784 + 3.510 = -0.735$$
$$8.257 = +0.729$$

from which

$$c = -0.188$$
$$\mu = -0.01759 = -0.1873 \qquad \mu_a = -0.0458$$
$$\pi = +0.0288 = +0.307 \pm 0.009$$

Probable error corresponding to unit weight,

$$\pm 0.025$$

Among the many determinations of the parallax of Procyon we have the following recent values:

Parallax	Observer	Method
$+0.33 \pm 0.039$........	Flint	Meridian Circle
0.334 ± 0.015........	Elkin	Heliometer
0.309 ± 0.007........	Mitchell	Photography
0.287 ± 0.012........	Miller	Photography
0.331..............	Adams	Spectrum

Weisse-Bessel II, 7ʰ1029 (7ʰ38ᵐ, +39°49′)

A proper motion of +0ˢ004, −0″52 is given by Ristenpart for this seventh-magnitude star in *Astronomische Nachrichten*, Vol. CLXXVII (1908), pp. 339–40. Porter finds $\mu = +0ˢ005$, $\mu' = -0″68$ (*Publications of the Cincinnati Observatory*, No. 18, p. 20).

The twelve plates of this series were measured by Miss Steele.

TABLE 1
PLATES OF W.B. II, 7ʰ1029

No.	Date	Hour Angle	Observers	Quality of Images
707.......	1912 Mar. 21	−0ʰ1	Su, Sl	Good
991.......	Nov. 10	−0.1	Su, M	Poor*
1000.......	Nov. 16	−0.8	Su, Sl	Good
1009.......	Nov. 17	−0.7	Su, M	Fair*
1148.......	1913 Mar. 6	−0.2	Su, Sl	Good
1157.......	Mar. 8	−0.2	M, Su	Fair
1428.......	Nov. 1	−0.4	Su, Sl	Good*
1443.......	Nov. 23	−0.3	Su, Sl	Poor
1784.......	1914 Nov. 1	+0.2	Su, L	Good*
1981.......	1915 Mar. 7	−0.4	Su, J	Good*
2387.......	Dec. 1	0.0	VB, Su	Good
2882.......	1916 Oct. 29	+0.2	Su, L	Good

* One exposure only.

COMPARISON STARS

No.	Diameter (Pl. 2387)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1..............	0.22	−72	+ 9	+0.147
2..............	.16	−31	−53	.166
3..............	.15	−16	+25	.192
4..............	.14	+58	−66	.232
5..............	.12	+61	+85	+0.263
Parallax star...	0.25	+ 7.0	+ 4.1	....

The mean magnitude of the comparison stars is about 11. The sector was used for reducing the parallax star by about 3ᴹ.

TABLE 2
REDUCTIONS FOR W.B. II, 7ʰ1029

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	mm					
707....	−3.622	0.8	−0.90	− 641	−0.006	−0″05
991....	.608	0.3	+ .88	− 407	+ .004	+ .02
1000....	.610	0.8	+ .83	− 401	+ .002	+ .02
1009....	.609	0.6	+ .82	− 400	+ .003	+ .02
1148....	.612	1.0	− .78	− 291	+ .003	+ .03
1157....	.614	0.9	− .80	− 289	+ .001	+ .01
1428....	.610	0.7	+ .94	− 51	.000	.00
1443....	.614	0.5	+ .76	− 29	− .004	− .03
1784....	.612	0.7	+ .94	+ 314	− .003	− .03
1981....	.608	0.7	− .78	+ 440	+ .004	+ .03
2387....	.608	1.0	+ .67	+ 709	.000	.00
2882....	−3.607	0.9	+0.96	+1042	+0.001	+0.01

The normal equations are:

$$8.9\,c + 3.776\,\mu + 1.876\,\pi = -32.140$$
$$244.953 + 16.285 = -13.507$$
$$6.263 = -6.757$$

from which

$$c = -3.612$$
$$\mu = +0.0004 = +0″004 \qquad \mu_a = +0ˢ0013$$
$$\pi = +0.0020 = +0″021 \pm 0″010$$

Probable error corresponding to unit weight,

$$\pm 0.0020 = \pm 0″021$$

The parallax +0″036 has been obtained by Adams from the study of the spectrum (*Astrophysical Journal*, Vol. XLVI [1917], p. 313).

ζ Cancri (8ʰ6ᵐ, +17°57′)

The plates for this triple star, which is Σ 1196, were exposed long enough to give a well measurable image of the third star C (6ᴹ1), as well as of the closer pair AB (4ᴹ7). With this exposure-time and unless the conditions of seeing are exceptionally good, the close pair does not appear as two distinct images; the two components merge into one elliptical image, on which settings are made without difficulty. The sixteen plates of this field were measured by Mr. Van Biesbroeck. The spectral class is F. The discrepancy between the values of μ_a found for AB and C respectively gives evidence of the orbital motion of C around the dark body, of which the presence has been inferred from the irregularities indicated by the micrometric measures.

TABLE 1
PLATES OF ζ CANCRI

No.	Date	Hour Angle	Observers	Quality of Images
2347.......	1915 Nov. 4	+0ʰ1	Su, L	Poor–Fair
2485.......	1916 Mar. 16	+0.4	VB, Su	Good
2899.......	Nov. 1	−0.3	Su, St	Good
2911.......	Nov. 3	+0.1	Su, L	Fair
2950.......	Nov. 19	+0.2	Su, St	Fair–Good
3603.......	1918 Feb. 24	+0.2	VB, Su	Good
3606.......	Feb. 28	+0.3	Su, P	Poor
3623.......	Mar. 7	+0.2	Su, P	Fair
3655.......	Mar. 24	+0.1	Su, VB	Good
3656.......	Mar. 24	+0.3	Su, VB	Good
3678.......	Mar. 28	+0.4	P, VB	Fair
3690.......	Apr. 4	+0.3	P, VB	Fair
4138.......	Nov. 10	−0.3	HP	Poor
4146.......	Nov. 12	+0.2	HP	Good
4169.......	Nov. 13	+0.1	VB	Good
4213.......	Nov. 28	+0.1	HP	Fair

COMPARISON STARS

No.	Diameter (Pl.3656)	X (Right Ascension)	Y (Declination)	Dependences AB	C	Adopted
	mm	mm	mm			
1.........	0.08	−70.4	−18.0	+0.220	+0.222	+0.221
2.........	.13	−30.5	+41.9	.103	.106	.105
3.........	.07	− 7.0	−52.6	.310	.308	.309
4.........	.11	+42.1	+29.4	.145	.148	.147
5.........	.07	+65.7	− 0.7	+0.219	+0.216	+0.218
AB........	.13	+− 0.1	−11.7	....	....	....
C.........	0.09	− 0.6	−11.5	....	....	....

The mean magnitude of the comparison stars is about 10. The rotating sector was used.

TABLE 2
REDUCTIONS FOR ζ CANCRI

No.	SOLUTION (m)		WEIGHT (p)	PARALLAX FACTOR (P)	TIME IN DAYS (t)	$\sqrt{\overline{p.v}}$ IN ARC	
	AB	C				AB	C
	mm	mm					
2347..	−0.222	+0.261	0.6	+0.947	−731	−0″02	+0″06
2485..	.231	.244	1.0	−0.812	−598	− .04	− .03
2899..	.206	.263	1.0	+0.959	−368	+ .07	− .06
2911..	.209	.267	0.7	+0.948	−366	+ .04	− .02
2950..	.220	.271	0.9	+0.852	−360	− .07	+ .03
3603..	.209	.282	1.0	−0.570	+112	+ .03	+ .04
3606..	.214	.278	0.4	−0.624	+116	− .01	+ .01
3623..	.210	.279	0.7	−0.710	+123	+ .03	+ .02
3655..	.218	.274	1.0	−0.876	+140	− .05	− .03
3656..	.212	.277	1.0	−0.876	+140	+ .01	.00
3678..	.213	.276	0.7	−0.905	+144	.00	.00
3690..	.207	.269	0.7	−0.944	+151	+ .05	− .06
4138..	.195	.304	0.4	+0.918	+371	+ .03	+ .03
4146..	.199	.292	1.0	+0.906	+373	.00	.00
4169..	.203	.300	1.0	+0.898	+374	− .04	+ .01
4213..	−0.205	+0.301	0.7	+0.783	+389	−0.04	+0.02

Normal equations:

$$\text{AB} \qquad \text{C}$$
$$12.8\,c − 0.861\,\mu + 0.501\,\pi = −2.704, \quad +3.540$$
$$156.223\,\mu − 3.685\,\pi = +0.463, \quad +0.368$$
$$9.358\,\pi = −0.063, \quad +0.192$$

hence

$$\text{AB}$$
$$c = −0.2113$$
$$\mu = +0.00193 = +0″0207 \quad \mu_a = +0^s0053$$
$$\pi = +0.00540 = +0″057 \pm 0″010$$

$$\text{C}$$
$$c = +0.2765$$
$$\mu = +0.00405 = +0″0434 \quad \mu_a = +0^s0110$$
$$\pi = +0.00724 = +0″077 \pm 0″010$$

Probable error corresponding to unit weight for AB, ±0″031

Probable error corresponding to unit weight for C, ±0″030

The resulting parallax for the system ζ Cancri is:

$$+0″067 \pm 0″007$$

Former determinations of parallax are as follows:

+0″005 ±0″033 . . . . Flint (*Astronomical Journal*, Vol. XXVII [1912], p. 49)

0.030 ±0.007 C } . . Miller (*Sproul Observatory Publications*, 0.035 ±0.011 AB } No. 4, p. 53)

0.042 C } . . Adams (*Astrophysical Journal*, Vol. XLVI 0.044 AB } [1917], p. 313)

B.D. +67°552 (8^h27^m, +67°38′)

This 9.3 magnitude star is number 899 in *Kristiania Merid.-Beob.* (1912), with a proper motion of −0^s191, 0″000. The eleven plates were measured by Miss Steele.

TABLE 1
PLATES OF B.D. +67°552

No.	Date	Hour Angle	Observers	Quality of Images
1149......	1913 Mar. 6	−0^h3	Su, Sl	Good
1179......	Apr. 5	− .1	M, Su	Good
1444......	Nov. 23	− .2	Su, Sl	Fair*
1531......	1914 Mar. 14	− .5	Su, Sl	Good
1785......	Nov. 1	− .1	Su, L	Good
1804......	Nov. 5	− .2	Su, L	Fair
2013......	1915 Mar. 13	− .2	Su, L	Good
2388......	Dec. 1	.0	VB, Su	Good
2900......	1916 Nov. 1	− .1	Su, St	Fair*
3140......	1917 Mar. 18	− .2	Su, L	Good
3156......	Mar. 24	−0.5	Su, L	Good

*One exposure only.

COMPARISON STARS

No.	Diameter (Pl. 2013)	X (Right Ascension)	Y (Declination)	Dependence
	mm	¼ mm	¼ mm	
1.............	0.15	−289	+122	+0.407
2.............	.09	+ 43	−249	.212
3.............	.10	+246	+127	+0.381
Parallax star...	0.23	− 14.8	+ 45.3	....

The mean magnitude of the comparison stars is about 11½. No sector was used on this field and the image of the parallax star is too large.

TABLE 2
REDUCTIONS FOR B.D. +67°552

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{\overline{p.v}}$ in Arc
	¼ mm					
1149....	+0.422	1.0	−0.63	−719	−0.003	−0″01
1179....	+ .389	1.0	− .92	−689	+ .008	+ .02
1444....	+ .222	0.5	+ .85	−457	+ .019	+ .04
1531....	+ .024	0.9	− .72	−346	+ .003	+ .01
1785....	− .188	1.0	+ .96	−114	− .026	− .07
1804....	− .168	0.6	+ .95	−110	− .002	− .05
2013....	− .374	1.0	− .71	+ 18	− .005	− .01
2388....	− .574	0.9	+ .80	+281	+ .018	+ .04
2900....	− .935	0.7	+ .96	+617	+ .012	+ .03
3140....	−1.164	1.0	− .77	+754	− .001	.00
3156....	−1.174	1.0	−0.83	+760	−0.003	−0.01

The normal equations are:

$$9.6\,c + 0.889\,\mu − 1.161\,\pi = − 3.229$$
$$270.808 + 3.375 = −29.232$$
$$6.542 = + 0.271$$

from which

$$c = −0.322$$
$$\mu = −0.1074 = −0″285 \qquad \mu_a = −0^s1781$$
$$\pi = +0.0398 = +0″106 \pm 0″009$$

Probable error corresponding to unit weight,

$$\pm 0.0088 = \pm 0″024$$

No other parallax is available for this star.

Lalande 19022 (9^h37^m, $+43°10'$)

This 8^M star is of spectral type K 5. It was placed on the program on account of the appreciable parallax found by Kapteyn and by Flint. Porter (*Publications of the Cincinnati Observatory*, No. 18, p. 24) gives the following proper motion:

$$\mu = +0\overset{s}{.}0038 \qquad \mu' = -0\overset{''}{.}818$$

or $0\overset{''}{.}82$ in position angle 177°.

The fifteen plates of this series were measured by Mr. Van Biesbroeck. In the solution all the values of m have been reduced by 0.600 so as to have smaller numbers.

TABLE 1
PLATES OF LALANDE 19022

No.	Date	Hour Angle	Observers	Quality of Images
2043	1915 Apr. 3	-0^h1	Su, L	Fair
2487	1916 Mar. 16	-0.1	VB, Su	Good
2095	Dec. 21	-0.1	L	Fair*
3005	Dec. 24	-0.4	Su, St	Fair
3007	Dec. 27	-0.4	Su, St	Good
3186	1917 Apr. 14	-0.4	Su, St	Good
3193	Apr. 15	0.0	Su, L	Good
3478	Nov. 25	-0.2	VB	Fair
3499	Dec. 9	-0.4	VB, Su	Fair–Poor
3658	1918 Mar. 24	0.0	Su, VB	Good
3679	Mar. 28	-0.5	P, VB	Good
3692	Apr. 4	-0.2	P, VB	Fair
3715	Apr. 14	-0.2	VB	Fair*
4184	Nov. 23	0.0	VB	Good
4221	Dec. 3	-0.2	VB	Good

* One exposure only.

COMPARISON STARS

No.	Diameter (Pl. 4221)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1	0.17	-56.2	$+70.3$	$+0.225$
2	.13	-27.2	$+6.3$	.190
3	.15	-15.8	-26.3	.170
4	.13	-3.0	-53.5	.156
5	.18	$+102.2$	$+3.2$	$+0.259$
Parallax star	0.13	$+6.1$	$+5.5$	....

The mean magnitude of the comparison stars is about 11. A reduction of about 3^M in the apparent brightness of the parallax star was obtained by means of the rotating sector.

TABLE 2
REDUCTIONS FOR LALANDE 19022

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p} \cdot v$ in Arc
	mm					
2043	-0.006	0.7	-0.737	-848	-0.001	$-0\overset{''}{.}01$
2487	$-.002$	1.0	$-.530$	-500	.000	.00
2095	$+.010$	0.5	$+.733$	-220	$+.004$	$+.03$
3005	$+.004$	0.7	$+.701$	-217	$-.001$	$-.01$
3007	$+.009$	1.0	$+.667$	-214	$+.004$	$+.04$
3186	$-.008$	1.0	$-.841$	-106	$-.005$	$-.05$
3193	$-.003$	1.0	$-.848$	-105	.000	.00
3478	$+.007$	0.7	$+.915$	$+119$	$-.001$	$-.01$
3499	$+.006$	0.6	$+.840$	$+133$	$-.001$	$-.01$
3658	$-.001$	1.0	$-.625$	$+238$	.000	.00
3679	$+.001$	1.0	$-.673$	$+242$	.000	.00
3692	$+.001$	0.7	$-.749$	$+249$	$+.001$	$+.01$
3715	$-.006$	0.5	$-.839$	$+259$	$-.004$	$-.03$
4184	$+.006$	1.0	$+.922$	$+482$	$-.003$	$-.03$
4221	$+0.010$	1.0	$+0.868$	$+494$	$+0.002$	$+0.02$

The normal equations are:

$$12.4\,c + 1.424\,\mu - 0.517\,\pi = -0.015$$
$$156.762 + 10.162 = +0.104$$
$$7.346 = +0.050$$

from which

$$c = +0.002$$
$$\mu = +0.00027 = 0\overset{''}{.}0028 \qquad \mu_a = +0\overset{s}{.}0010$$
$$\pi = +0.00631 = +0\overset{''}{.}067 \pm 0\overset{''}{.}008$$

Probable error corresponding to unit weight,

$$\pm 0\overset{''}{.}020$$

Other determinations are:

Parallax	Observer	Method
$+0\overset{''}{.}064 \pm 0\overset{''}{.}022$	Kapteyn	Meridian Circle
$+0.132 \pm 0.029$	Flint	Meridian Circle
$+0.067$	Adams	Spectrum

Lalande 19229 (9^h43^m, $+14°14'$)

The twelve plates of this eighth-magnitude star were measured by Miss Steele. Porter gives the proper motion $+0\overset{s}{.}0236$, $-0\overset{''}{.}755$, or a total motion of $0\overset{''}{.}829$, in *Publications of the Cincinnati Observatory*, No. 18, p. 24.

TABLE 1
PLATES OF LALANDE 19229

No.	Date	Hour Angle	Observers	Quality of Images
600	1911 Dec. 18	-0^h6	Su, Sl	Fair
687	1912 Mar. 5	-0.4	Su, V	Good
753	Apr. 20	$+0.3$	Sl, Su	Good
993	Nov. 10	-0.6	Su, M	Poor
1003	Nov. 16	$+0.1$	Su, Sl	Poor
1012	Nov. 17	0.0	Su, M	Good
1152	1913 Mar. 6	$+0.3$	Su, Sl	Good
1181	Apr. 5	$+0.2$	Su, M	Poor
1446	Nov. 23	$+0.4$	Su, Sl	Poor
1546	1914 Apr. 2	-0.2	Su, Sl	Fair
1558	Apr. 11	$+0.2$	Su, Sl	Good
1831	Nov. 21	$+0.1$	Su, J	Fair

COMPARISON STARS

No.	Diameter (Pl. 1152)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1	0.14	-67	-40	$+0.115$
2	.11	-45	$+68$	.380
3	.12	$+39$	-31	.202
4	.23	$+73$	$+3$	$+0.303$
Parallax star	0.15	$+5.2$	$+15.9$	....

The sector was used for reducing the parallax star by about 3^M in apparent brightness. The mean magnitude of the comparison stars is about $11\frac{1}{2}$.

TABLE 2
REDUCTIONS FOR LALANDE 19229

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	mm					
600....	−0.016	0.7	+0.78	−433	+0.002	+0″02
687....	− .006	0.9	− .34	−355	+ .004	+ .04
753....	− .008	1.0	− .88	−309	− .002	− .02
993....	+ .016	0.5	+ .93	−105	+ .001	+ .01
1003....	+ .008	0.6	+ .93	− 99	− .007	− .06
1012....	+ .021	0.9	+ .94	− 98	+ .006	+ .06
1152....	+ .019	1.0	− .35	+ 11	− .007	− .07
1181....	+ .023	0.5	+ .75	+ 41	− .006	− .04
1446....	+ .044	0.6	+ .93	+273	− .008	− .07
1546....	+ .069	0.8	− .71	+403	+ .004	+ .04
1558....	+ .067	1.0	− .80	+412	+ .001	+ .01
1831....	+0.092	0.7	+0.93	+636	+0.003	+0.03

The normal equations are:

$$9.2\,c + 2.432\,\mu + 0.345\,\pi = +0.251$$
$$98.868 \quad -0.539 \quad = +1.048$$
$$5.622 \quad = +0.006$$

from which

$$c = +0.025$$
$$\mu = +0.0100 = +0''.107 \qquad \mu_a = +0^s.0269$$
$$\pi = +0.0005 = +0''.006 \pm 0''.015$$

Probable error corresponding to unit weight,

$$\pm 0.0048 = \pm 0''.035$$

The parallax −0″.063 ± 0″.055 has been obtained by Chase with the heliometer.

7 Sextantis (9ʰ47ᵐ, +2°55′)

The eleven plates of this 5ᴹ9 star were measured by Miss Steele. The spectral type is A. According to Boss the proper motion is:

$$\mu = -0^s.0122 \qquad \mu' = +0''.90$$

TABLE 1
PLATES OF 7 SEXTANTIS

No.	Date	Hour Angle	Observers	Quality of Images
1861......	1914 Dec. 2	+0ʰ3	Su, J	Poor
2046......	1915 Apr. 15	−0.2	Su, J	Fair*
2382......	Nov. 21	+0.3	Su, L	Poor*
2409......	1916 Jan. 5	+0.2	VB, Su	Poor
2506......	Apr. 9	+0.1	VB, Su	Poor
2522......	Apr. 27	+0.2	VB	Good
2535......	May 4	+0.8	VB	Fair*
2957......	Nov. 24	−0.2	Su, L	Fair
2978......	Dec. 4	0.0	Su, L	Fair
3132......	1917 Mar. 3	0.0	Su, St	Fair
3158......	Mar. 24	−0.3	Su, L	Fair

* One exposure only.

COMPARISON STARS

No.	Diameter (Pl. 2522)	X (Right Ascension)	Y (Declination)	Dependence
	mm	¼ mm	¼ mm	
1.............	0.26	−366	+131	+0.326
2.............	.16	−109	−198	.263
3.............	.26	+136	−154	.217
4.............	.22	+339	+221	+0.194
Parallax star...	0.14	− 52.5	+ 0.2	....

The sector was used for the parallax star. The mean magnitude of the comparison stars is about 10.

TABLE 2
REDUCTIONS FOR 7 SEXTANTIS

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	¼ mm					
1861....	+0.370	0.4	+0.89	−520	−0.003	0″00
2046....	.311	0.6	− .82	−386	− .003	.00
2382....	.312	0.3	+ .93	−166	− .002	.00
2409....	.280	0.4	+ .60	−121	− .020	− .04
2506....	.249	0.4	− .78	− 26	− .004	− .01
2522....	.254	0.9	− .91	− 8	+ .007	+ .02
2535....	.257	0.6	− .93	− 1	+ .009	+ .02
2957....	.257	0.6	+ .93	+203	+ .006	+ .01
2978....	.260	0.8	+ .88	+213	+ .011	+ .03
3132....	.194	0.8	− .25	+302	− .016	− .04
3158....	+0.193	0.6	−0.60	+323	−0.005	−0.01

The normal equations are:

$$6.4\,c + 1.716\,\mu - 0.604\,\pi = +1.657$$
$$40.861 \quad +0.314 \quad = -0.231$$
$$4.035 \quad = -0.079$$

from which

$$c = +0.266$$
$$\mu = -0.0170 = -0''.045 \qquad \mu_a = -0^s.0110$$
$$\pi = +0.0215 = +0''.057 \pm 0''.008$$

Probable error corresponding to unit weight,

$$\pm 0.0055 = \pm 0''.015$$

No other parallax is available for this star.

Lalande 21185 (10ʰ58ᵐ, +36°38′)

The nine plates of this 7ᴹ5 star of large proper motion were measured by Miss Steele. The star is also 22 H Camelopardalis. In Boss's *Preliminary General Catalogue* the proper motion is given as −0^s.0469, −4″.746.

TABLE 1
PLATES OF LALANDE 21185

No.	Date		Hour Angle	Observers	Quality of Images
178......	1909	Dec. 30	−1ʰ0	Su, Sl	Good
754......	1912	Apr. 20	−0.1	V, Sl	Good
1901......	1915	Jan. 13	−0.2	Su, L	Fair
1911......		Jan. 14	−0.1	Su, L	Good
2050......		Apr. 24	−0.5	Su, J	Fair
2057......		Apr. 25	−0.3	Su, L	Good
2404......	1916	Jan. 2	0.0	Su, L	Poor*
2417......		Jan. 6	−0.3	Su, L	Good
2524......		Apr. 27	+0.1	V, Su	Good*

* One exposure only.

COMPARISON STARS

No.	Diameter (Pl. 1911)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1............	0.17	+74	−60	+0.269
2............	.10	+45	+ 8	.258
3............	.11	−55	+58	.234
4............	.09	−64	− 6	+0.239
Parallax star...	0.13	+ 3.3	− 1.9	....

The sector was used for reducing the brightness of the parallax star by about 3^M. The mean magnitude of the comparison stars is about 11.

TABLE 2
REDUCTIONS FOR LALANDE 21185

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p}.v$ in Arc
	mm				mm	
178....	+0.032	1.0	+0.81	−1679	+0.001	+0ʺ01
754....	− .141	1.0	− .69	− 837	− .002	− .02
1901....	.227	0.7	+ .70	+ 161	− .001	− .01
1911....	.225	1.0	+ .69	+ 162	+ .001	+ .01
2050....	.286	0.8	− .72	+ 262	+ .005	+ .04
2057....	.288	0.8	− .72	+ 263	+ .003	+ .03
2404....	.280	0.3	+ .79	+ 515	− .008	− .04
2417....	.272	0.9	+ .77	+ 519	.000	.00
2524....	−0.345	0.7	−0.75	+ 631	−0.002	−0.02

The normal equations are:

$$7.2\ c - 7.580\ \mu + 0.553\ \pi = -1.523$$
$$427.495\ -7.437\ = -4.414$$
$$3.896\ = +0.115$$

from which

$$c = -0.229$$
$$\mu = -0.0138 = -0ʺ148 \qquad \mu_s = -0ʺ0449$$
$$\pi = +0.0357 = +0ʺ382 \pm 0ʺ011$$

Probable error corresponding to unit weight,

$$\pm 0.0021 = \pm 0ʺ022$$

The former determinations of the parallax of Lalande 21185 are:

Parallax	Observer	Method
+0ʺ511 ±0ʺ015........	Winnecke	Heliometer
.501 ± .011........	Winnecke	Heliometer
.428 ± .030........	Kapteyn	Meridian Circle
.36 ± .047........	Flint	Meridian Circle
.306 ± .052........	Jost	Meridian Circle
.391 ± .038........	Jost	Meridian Circle
.397 ± .045........	Jost	Meridian Circle
.359 ± .048........	Jost	Meridian Circle
.363 ± .023........	Jost	Meridian Circle
.346 ± .015........	Russell	Photography
.335 ± .031........	Russell	Photography
.344 ± .013........	Russell	Photography
.392 ± .009........	Chase	Heliometer
.433 ± .010........	Miller	Photography
0.437............	Adams	Spectrum

B.D. 28°2078 (12ʰ1ᵐ, 28°3′)

According to Wolf (*Astronomische Nachrichten*, Vol. CLXXI [1906], p. 327), this 9ᴹ1 star has a proper motion of 0ʺ41 in 273°6. When the set of plates for this star was considered as complete, it was found that in making the chart of the region in 1912 the star had been wrongly identified. The field had been centered on B.D. 28°2080. On all the plates the proper-motion star is far from the center. It was found that three comparison stars could be used, but they are badly distributed, as shown by the predominant dependence of Star 1, which is a great deal fainter than the others. However rough the resulting determination may be, it shows that the star has no exceptionally large parallax and it was not thought worth while to start a better series of plates. The fourteen plates were measured by Mr. Van Biesbroeck.

TABLE 1
PLATES FOR B.D. 28°2078

No.	Date		Hour Angle	Observers	Quality of Images
1575......	1914	Apr. 26	−1ʰ0	L	Poor
2434......	1916	Feb. 2	0.0	Su, VB	Fair
2526......		Apr. 27	+0.1	Su, VB	Good
2549......		May 18	−0.1	Su, VB	Good
3008......		Dec. 24	−0.2	Su, St	Poor
3103......	1917	Feb. 13	0.0	Su, L	Fair
3209......		May 5	−0.3	Su, L	Fair–Good
3212......		May 6	−0.1	Su, St	Fair–Poor
3524......	1918	Jan. 15	−0.2	P, VB	Poor–Fair
3542......		Jan. 22	−0.4	P, VB	Fair
3557......		Jan. 31	+0.1	P, Su	Poor
3583......		Feb. 12	0.0	VB	Good
3752......		May 14	+0.4	P	Fair
3756......		May 15	+0.2	VB	Fair

COMPARISON STARS

Star	Diameter (Pl. 2526)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1............	0.16	−30.9	−12.9	+0.798
2............	.19	−29.8	+ 7.9	0.120
3............	.11	+60.7	+ 5.0	+0.083
Parallax star...	0.25	−23.2	− 9.0	....

The mean magnitude of the comparison stars is about 10. The rotating sector was not used on this field.

TABLE 2

REDUCTIONS FOR B.D. 28°2078

No.	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	mm					
1575....	−0.020	0.3	−0.536	−931	+0.005	0″00
2434....	.288	0.7	+ .664	−284	− .027	− .06
2526....	.315	1.0	− .556	−199	− .016	− .04
2549....	.277	1.0	− .781	−178	+ .032	+ .08
3008....	.356	0.4	+ .901	+ 42	+ .025	+ .04
3103....	.351	0.7	+ .526	+ 93	+ .052	+ .11
3209....	.464	0.8	− .648	+174	− .024	− .06
3212....	.487	0.5	− .660	+175	− .046	− .09
3524....	.541	0.5	+ .818	+429	− .014	− .03
3542....	.543	0.7	+ .765	+436	− .014	− .03
3557....	.554	0.4	+ .680	+445	− .020	− .03
3583....	.523	0.7	+ .548	+457	− .016	+ .04
3752....	.581	0.7	− .740	+548	.000	.00
3756....	−0.557	0.7	−0.749	+549	+0.025	+0.06

Normal equations:

$$9.1 \, c + 12.390 \, \mu − 0.596 \, \pi = −3.837$$
$$130.575 \quad +3.024 \quad = −9.458$$
$$4.302 \quad = +1.340$$

from which

$$c = −0.371$$
$$\mu = −0.0374 \qquad \mu_a = −0^s.028$$
$$\pi = +0.0062 = +0″.017 \pm 0″.022$$

Probable error corresponding to unit weight,

$$\pm 0″.044$$

δ Corvi (12ʰ25ᵐ, −15°58′)

This 3ᴹ1 star is β G.C. 6183. Boss gives a proper motion of −0ˢ0144, −0″.143. The spectral type is A. The 9ᴹ companion found by South has the same proper motion, the relative position being unchanged since 1823. It does not show on the plates on account of the reduction by the sector. The fifteen plates were measured by Mrs. Pettit.

TABLE 1

PLATES OF δ CORVI

No.	Date		Hour Angle	Observers	Quality of Images
2407.......	1916	Jan. 2	0ʰ0	Su, L	Poor
2446.......		Feb. 6	−0.5	Su, L	Good
2527.......		Apr. 27	+0.1	VB	Good
2550.......		May 18	0.0	VB, Su	Good
2551.......		May 18	+0.1	VB, Su	Good
3099.......	1917	Feb. 11	−0.1	Su, St	Good
3518.......	1918	Jan. 13	+0.1	VB, P	Fair†
3525.......		Jan. 15	−0.2	P	Fair
3526.......		Jan. 15	−0.1	VB	Fair
3527.......		Jan. 15	+0.1	VB, P	Fair
3543.......		Jan. 22	−0.1	VB	Fair*
3544.......		Jan. 22	+0.2	P	Fair
3773.......		May 26	+0.8	VB	Fair†
3775.......		May 30	+0.2	Fa, VB	Fair†
3780.......		May 31	+0.3	VB	Fair†

* One exposure only.
† Three exposures.

COMPARISON STARS

No.	Diameter (Pl. 2550)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1............	0.34	−80	+38	+0.394
2............	.11	+ 4	−46	.411
3............	.27	+76	+ 9	+0.195
Parallax star...	0.28	−15.1	− 2.5	....

The sector was used for reducing the parallax star by about 6ᴹ. The mean magnitude of the comparison stars is about 9.

TABLE 2

REDUCTIONS FOR δ CORVI

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	mm					
2407....	+0.025	0.5	+0.90	−529	0.000	0″00
2446....	+ .026	0.9	+ .68	−494	+ .003	+ .03
2527....	+ .013	0.8	− .48	−413	− .004	− .04
2550....	+ .016	1.0	− .72	−392	− .001	− .01
2551....	+ .018	0.8	− .72	−392	+ .001	+ .01
3099....	+ .008	0.9	+ .62	−123	− .001	− .01
3518....	− .005	1.0	+ .87	+213	− .002	− .02
3525....	− .001	0.6	+ .86	+215	+ .002	+ .02
3526....	− .006	0.7	+ .86	+215	− .003	− .03
3527....	− .002	0.8	+ .86	+215	+ .001	+ .01
3543....	− .002	0.5	+ .81	+222	+ .001	+ .01
3544....	− .006	0.7	+ .81	+222	− .003	− .03.
3773....	− .011	1.1	+ .71	+346	.000	.00
3775....	− .011	0.8	− .82	+350	+ .001	+ .01
3780....	−0.011	0.8	−0.83	+351	+0.001	+0.01

The normal equations are:

$$11.9 \, c + 0.165 \, \mu + 1.487 \, \pi = +0.034$$
$$131.606 \quad +1.140 \quad = −0.492$$
$$7.026 \quad = +0.013$$

from which

$$c = +0.003$$
$$\mu = −0.0038 = −0″.041 \qquad \mu_a = −0^s.0104$$
$$\pi = +0.0019 = +0″.020 \pm 0″.005$$

Probable error corresponding to unit weight,

$$\pm 0.0013 = \pm 0\overset{\prime\prime}{.}014$$

No other determination of parallax is available for this star.

β 612 (13^{h}35^m, +11°15′)

This binary star, which is β G.C. 6578, has a period of 23 years. The two components are equal in magnitude, but their distance is so small that the images appear round on the plates. The total magnitude is 5^{M}5 and the spectral type is A. In Boss's *Preliminary General Catalogue* the proper motion is given as follows:

$$\mu = -0\overset{s}{.}0076 \qquad \mu' = -0\overset{\prime\prime}{.}011$$

The fourteen plates of this field were measured by Mrs. Pettit.

TABLE 1
PLATES OF β 612

No.	Date			Hour Angle	Observers	Quality of Images
415.......	1911	May	6	+0^{h}8	Sl, Su	Fair
690.......	1912	Mar.	5	−0.8	Su, V	Fair
780.......		June	9	+0.2	Su, M	Fair
1118.......	1913	Feb.	8	−0.2	Su, Sl	Fair
1138.......		Feb.	12	−0.1	Su, Sl	Fair*
2092.......	1915	May	30	−0.2	Su, J	Fair
2097.......		June	6	0.0	Su, J	Good
2421.......	1916	Jan.	6	−0.1	Su, L	Poor*
2422.......		Jan.	6	+0.1	Su, L	Poor
2442.......		Feb.	3	−0.1	Su, L	Fair
3239.......	1917	June	3	−0.4	Su, L	Poor*
3591.......	1918	Feb.	21	−0.1	VB, Su	Fair*
3785.......		June	1	−0.4	VB, VB	Fair
3789.......		June	2	−0.3	VB, Su	Fair

* One exposure only.

COMPARISON STARS

No.	Diameter	X (Right Ascension)	Y (Declination)	Dependence
	mm	¼ mm	¼ mm	
1............	0.20	−442	+209	+0.195
2............	.25	−411	+124	.187
3............	.16	+216	−269	.180
4............	.22	+299	+ 87	.233
5............	.29	+338	−151	+0.205
Parallax star...	0.38	+ 14.9	+ 4.8	....

The sector was used for the parallax star. The mean magnitude of the comparison stars is about 11.

TABLE 2
REDUCTIONS FOR β 612

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p}\cdot v$ in Arc
	¼ mm					
415....	+0.106	0.8	−0.31	−1427	+0.010	+0$\overset{\prime\prime}{.}$02
690....	+ .091	0.8	+ .59	−1124	+ .016	+ .04
780....	+ .048	0.8	− .75	−1027	− .008	− .02
1118....	+ .048	0.8	+ .83	− 783	+ .004	+ .01
1138....	+ .033	0.6	+ .80	− 770	− .010	− .02
2092....	− .054	0.8	− .65	+ 58	− .008	− .02
2097....	− .052	0.0	− .72	+ 65	− .006	− .02
2421....	− .072	0.4	+ .90	+ 279	− .017	− .03
2422....	− .072	0.5	+ .90	+ 279	− .017	− .03
2442....	− .066	0.8	+ .87	+ 307	− .007	− .02
3239....	− .125	0.4	− .69	+ 793	− .009	− .02
3591....	− .110	0.8	+ .72	+1056	+ .014	+ .03
3785....	− .138	0.8	− .66	+1156	+ .012	+ .03
3789....	−0.144	0.7	−0.68	+1157	+0.006	+0.01

The normal equations are:

$$9.9\,c - \quad 4.579\,\mu + 0.402\,\pi = -0.308$$
$$763.983 \quad -8.585 \quad = -7.093$$
$$5.157 \quad = +0.104$$

from which

$$c = -0.036$$
$$\mu = -0.0094 = -0\overset{\prime\prime}{.}025 \qquad \mu_a = -0\overset{s}{.}0062$$
$$\pi = +0.0073 = +0\overset{\prime\prime}{.}019 \pm 0\overset{\prime\prime}{.}008$$

Probable error corresponding to unit weight,

$$\pm 0.0068 = \pm 0\overset{\prime\prime}{.}018$$

The parallax +0$\overset{\prime\prime}{.}$24 ± 0$\overset{\prime\prime}{.}$098 has been obtained by Flint with the meridian circle; −0$\overset{\prime\prime}{.}$016 ± 0$\overset{\prime\prime}{.}$012 by Miller photographically.

Σ 1835 (14^{h}18^m, +8°54′)

The bright component of this triple star has a magnitude of 5.1 and spectrum A, with a small proper motion

$$\mu_a = -0\overset{s}{.}0046 \qquad \mu' = -0\overset{\prime\prime}{.}025$$

according to Boss. The Struve companion of magnitude 6^{M}6 was found by Burnham to be a close double (β 1111) with two equal components whose distance is always less than 0$\overset{\prime\prime}{.}$3. The period is about 44 years. The exceedingly slow relative motion in the Struve pair shows that the three stars have the same proper motion and consequently form a triple system.

The close pair appears round on all the plates: 15 of these were measured by Mr. Van Biesbroeck. On three of them the image of β 1111 is too faint for measurement.

TABLE 1

PLATES OF Σ 1835

No.	Date		Hour Angle	Observers	Quality of Images
2431......	1916	Feb. 1	$+0^{h}2$	VB, Su	Fair–Poor
2443......		Feb. 3	-0.1	Su, L	Poor
2473......		Mar. 9	-0.2	VB, Su	Good
2488......		Mar. 16	-0.2	Su, L	Good
2569......		June 4	$+0.1$	VB, Su	Poor
3055..:....	1917	Jan. 16	-0.1	L	Poor*
3238......		May 27	0.0	Su, L	Fair
3779......	1918	May 30	$+0.3$	VB, Fa	Fair
3786......		June 1	$+0.4$	VB	Fair
3790......		June 2	$+0.1$	VB	Good
3804......		June 20	$+0.2$	P, St	Good
4314......	1919	Jan. 26	$+0.1$	P, HP	Good
4318......		Jan. 28	-0.5	HP, P	Good
4345......		Feb. 1	$+0.2$	VB	Fair
4385......		Feb. 19	0.0	VB	Fair–Poor

* One exposure only.

COMPARISON STARS

No.	DIAMETER (Pl.4314)	X (RIGHT ASCENSION)	Y (DECLINATION)	DEPENDENCES		
				A	BC	Adopted
	mm	$\frac{1}{4}$ mm	$\frac{1}{4}$ mm			
1.........	0.25	-298.9	-217.3	$+0.336$	$+0.341$	$+0.339$
2.........	.14	-242.3	$+111.3$	.203	.198	.200
3.........	.26	$+251.8$	-49.4	.272	.275	.274
4.........	.20	$+289.5$	$+155.4$	$+0.189$	$+0.186$	$+0.187$
Parallax star A...	.26	-26.3	-34.5	......	......	......
Parallax star BC.	0.14	-26.8	-36.9	......	......	......

The mean magnitude of the comparison stars is about $9\frac{1}{2}$. The rotating sector was used on the parallax star.

TABLE 2

REDUCTIONS FOR Σ 1835

PLATE	SOLUTION (m)		WEIGHT (p)	PARALLAX FACTOR (P)	TIME IN DAYS (t)	$\sqrt{p \cdot v}$ IN ARC	
	A	BC				A	B and C
	$\frac{1}{4}$ mm	$\frac{1}{4}$ mm					
2431..	$+0.352$	......	0.4	$+0.982$	-590	$+0''01$	......
2443..	.367	-0.036	0.3	$+.925$	-588	$+.03$	$+0.04$
2473..	.343	.068	1.0	$+.694$	-553	$-.01$	.00
2488..	.344	.072	1.0	$+.614$	-546	$-.01$	$-.01$
2569..	.352	.079	0.3	$-.577$	-466	$+.02$	.00
3055..	.337	......	0.3	$+.915$	-240	.00	......
3238..	.311	.049	0.7	$-.498$	-109	$-.03$	$+.09$
3779..	.312	.138	0.7	$-.504$	$+259$	.00	$-.07$
3786..	.332	.113	0.7	$-.531$	$+261$	$+.04$	$-.01$
3790..	.285	.110	1.0	$-.544$	$+262$	$-.07$	.00
3804..	.328	.092	1.0	$-.752$	$+280$	$+.04$	$+.05$
4314..	.307	.113	1.0	$+.929$	$+500$	$-.01$	$-.01$
4318..	.307	.092	1.0	$+.931$	$+502$	.00	$+.05$
4345..	.349	-0.102	0.6	$+.928$	$+506$	$+.08$	$+0.02$
4385..	$+0.273$	......	0.4	$+0.845$	$+524$	-0.06	......

The normal equations for A arc:

$$10.4\ c+\quad 6.217\ \mu+2.484\ \pi=+3.358$$
$$194.477\quad -1.782\quad =+1.321$$
$$5.828\quad =+0.837$$

from which

$$c=+0.324$$
$$\mu=-0.00352=-0''00937\qquad \mu_a=-0^{s}0023$$
$$\pi=+0.00444=+0''012\pm0''012$$

Probable error corresponding to unit weight,

$$\pm0''029$$

For BC the normal equations are:

$$9.3\ c+\quad 7.201\ \mu+1.460\ \pi=-0.853$$
$$167.842\quad -0.914\quad =-1.359$$
$$4.875\quad =-0.098$$

from these

$$c=-0.094$$
$$\mu=-0.00423=-0.01126\qquad \mu_a=-0^{s}0028$$
$$\pi=+0.00584=+0''016\pm0''015$$

Probable error corresponding to unit weight,

$$\pm0''032$$

Combining the two results, the parallax of the systems is

$$\pi=+0''013\pm0''009$$

The parallax of this star has also been determined at the Sproul Observatory by Miller, who gives the following results:

Bright component.... $+0''011\pm0''005$
β 1111............ $+0.013\pm0.007$

B.D. 25° 2874 = A.G. Cbr. E. 7086 (15h3m +25°18′)

This $9^{M}2$ star is No. 864 in Porter's *Catalogue of Proper-Motion Stars* (*Publications of the Cincinnati Observatory*, No. 12, p. 151). He finds:

$$\mu=-0^{s}060\qquad \mu'=+0''44$$

corresponding to a total annual motion of $0''93$.

The star is included in the Oxford Zones of the *Astrographic Catalogue:* Oxf. ph. 25°44446 = 26°36442. By comparing two plates taken at an interval of 9.74 years at Oxford, Bellamy deduces $\mu=0''995$. (*Monthly Notices of the Royal Astronomical Society*, Vol. LXXII [1911], p. 71.)

Although the star is about one magnitude brighter than the comparison stars no rotating sector was used in the present series of plates. The orientation of the field for 1900.0 was found by means of the standard co-ordinates of the comparison stars in the *Astrographic Catalogue*. The twenty plates were measured by Mr. Van Biesbroeck.

TABLE 1
PLATES OF B.D. 25°2874

No.	Date		Hour Angle	Observers	Quality of Images
668......	1912	Feb. 9	−0ʰ4	Su, Sl	Good
678......		Feb. 18	0.0	Sl, Su	Fair–Poor
692......		Mar. 5	−0.7	Sl	Fair
697......		Mar. 17	−1.0	Su, V	Poor–Fair
788......		June 16	+0.3	Su, Sl	Poor
1098......	1913	Feb. 1	+0.1	Su, Sl	Poor
1110......		Feb. 6	−0.3	Su, M	Poor
1129......		Feb. 9	−0.1	Su, M	Fair
1275......		June 26	+0.1	Su, M	Fair
1279......		June 28	−0.1	Su, M	Poor
1485......	1914	Jan. 31	−0.2	Su, Sl	Poor
1507......		Feb. 26	−0.3	Su, Sl	Good
1524......		Mar. 12	−0.7	Su, Sl	Fair
1600......		June 14	−0.5	Su, Sl	Fair
1601......		June 18	−0.2	Su, Sl	Fair
2605......	1916	June 22	+0.2	Y, Su	Poor
3133......	1917	Mar. 4	+0.4	Su, L	Poor
3627......	1918	Mar. 7	−0.1	Su, VB	Poor
3628......		Mar. 7	+0.4	Su, VB	Poor
3682......		Mar. 28	−0.1	VB, Su	Poor

COMPARISON STARS

No.	Diameter (Pl. 1507)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1.............	0.14	−74.9	+36.2	+0.107
2.............	.16	− 6.9	+19.8	.547
3.............	.16	+35.4	−16.1	.335
4.............	.18	+46.4	−39.9	+0.011
Parallax star...	0.24	+ 0.52	+ 8.89	....

The mean magnitude of the comparison stars is about 10½.

TABLE 2
REDUCTIONS FOR B.D. 25°2874

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p} \cdot v$ in Arc
	mm					
668....	+0.0080	1.0	+0.948	− 884	−0.013	−0ʺ01
678....	+ .0057	0.6	+ .932	− 875	− .034	−0.03
692....	+ .0050	0.5	+ .848	− 859	− .037	−0.03
697....	+ .0096	0.6	+ .744	− 847	+ .022	+0.02
788....	− .0059	0.4	− .577	− 756	− .024	−0.02
1098....	+ .0004	0.4	+ .043	− 526	− .045	−0.03
1110....	+ .0041	0.4	+ .948	− 521	− .007	0.00
1129....	+ .0068	0.7	+ .948	− 518	+ .021	+0.02
1275....	− .0097	0.7	− .708	− 381	− .006	0.00
1279....	− .0102	0.4	− .731	− 379	− .007	0.00
1485....	+ .0046	0.4	+ .941	− 162	+ .043	+0.03
1507....	+ .0011	1.0	+ .897	− 136	+ .015	+0.02
1524....	+ .0032	0.7	+ .796	− 122	+ .045	+0.04
1600....	− .0097	0.7	− .543	− 28	+ .027	+0.02
1601....	− .0091	0.7	− .609	− 24	+ .038	+0.03
2605....	− .0301	0.4	− .665	+ 711	− .076	−0.05
3133....	− .0207	0.4	+ .865	+ 966	− .064	−0.04
3627....	− .0169	0.4	+ .836	+1334	− .008	−0.01
3628....	− .0227	0.4	+ .836	+1334	− .066	−0.04
3682....	−0.0174	0.4	+0.625	+1355	+0.004	+0.01

In order to avoid large numbers an approximate proper motion of −0.0002 mm per day was assumed.

The measures were corrected by that amount before entering them in the column "Solution."

The normal equations are as follows:

$$11.0\,c - 18.930\,\mu + 4.800\,\pi = -0.03779$$
$$560.794 \quad -11.886 \quad = -0.62298$$
$$7.412 \quad = +0.02815$$

from which

$$c = -0.0087$$
$$\mu = -0.021246 = -0ʺ2263 \quad \mu_a = -0ˢ0610$$
$$\pi = +0.007404 = +0ʺ079 \pm 0ʺ009$$

Probable error corresponding to unit weight,

$$\pm 0ʺ019$$

No other parallax determinations are available.

γ Coronae (15ʰ39ᵐ, +26°37′)

This 3ᴹ9 star is the binary Σ 1967 (β G.C. 7368). The companion is about 3ᴹ fainter than the primary star and does not show on the plates. The period is about 80 years. Boss gives the proper motion:

$$\mu = -0ˢ0075 \qquad \mu' = +0ʺ030$$

The spectral type is A. The twelve plates of this star were measured by Miss Steele.

TABLE 1
PLATES OF γ CORONAE

No.	Date		Hour Angle	Observers	Quality of Images
254......	1910	June 10	−0ʰ2	Su, Sl	Poor
1961......	1915	Feb. 27	+0.1	Su, J	Fair*
2019......		Mar. 17	−0.1	Su, J	Fair
2034......		Mar. 28	−0.3	Su, L	Fair
2607......	1916	June 26	−0.3	Y, Su	Poor
2612......		June 27	+0.1	Y, Su	Good
2629......		July 6	−0.3	Su, Y	Fair
2630......		July 6	+0.2	Y, Su	Good
2655......		July 14	+0.4	Su, Y	Good
3102......	1917	Feb. 11	−0.3	Su, St	Fair*
3108......		Feb. 13	−0.4	Su, L	Good
3119......		Feb. 27	−0.6	Su, St	Good*

* One exposure only.

COMPARISON STARS

No.	Diameter (Pl. 3119)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1.............	0.29	−81	−59	+0.230
2.............	.29	−29	+74	.234
3.............	.15	+25	− 6	.258
4.............	.20	+84	− 9	+0.278
Parallax star...	0.15	+ 4.6	− 0.3	....

The double sector was used for reducing the parallax star by about 6^M. The mean magnitude of the comparison stars is about 10.

TABLE 2
REDUCTIONS FOR γ CORONAE

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	mm					
254....	+0.082	0.4	−0.37	−1968	+0.001	+0".01
1961....	.018	0.5	+ .92	− 245	− .009	− .06
2019....	.034	0.6	+ .84	− 227	+ .008	+ .06
2034....	.026	0.7	+ .74	− 216	.000	.00
2607....	.018	0.4	− .60	+ 240	+ .005	+ .03
2612....	.010	1.0	− .62	+ 241	− .002	− .02
2629....	.014	0.8	− .73	+ 250	+ .001	+ .01
2630....	.012	1.0	− .73	+ 250	− .001	− .01
2655....	.014	1.0	− .81	+ 258	+ .001	+ .01
3102....	.014	0.5	+ .96	+ 470	+ .009	+ .06
3108....	+ .004	1.0	+ .96	+ 472	− .001	− .01
3119....	0.000	0.7	+0.94	+ 486	−0.004	−0.03

The normal equations are:

$$8.6\,c + 8.951\,\mu + 0.448\,\pi = +0.145$$
$$240.155 + 2.063 = -0.568$$
$$5.429 = -0.001$$

from which

$$c = +0.020$$
$$\mu = -0.0031 = -0".033 \qquad \mu_a = -0^s.0090$$
$$\pi = -0.0007 = -0".007 \pm 0".012$$

Probable error corresponding to unit weight,

$$\pm 0.0027 = \pm 0".029$$

The parallax $+0".031 \pm 0".006$ has been obtained by Miller by photography.

Weisse-Bessel I 16^h400 $(16^h24^m, +3°29')$

For this 9^M star, which is B.D. $+3°3203$, Porter gives a proper motion of $0^s.000$, $-0".53$ (*Publications of the Cincinnati Observatory*, No. 18, p. 41). The eleven plates were measured by Mrs. Pettit.

TABLE 1
PLATES OF W.B. I, 16^h400

No.	Date	Hour Angle	Observers	Quality of Images
2514......	1916 Apr. 16	−0ʰ1	Su, L	Fair
2639......	July 10	−0.3	Su, Y	Fair
2663......	July 18	+0.2	Y, Su	Good
2683......	July 27	+0.3	Su, L	Good
3163......	1917 Mar. 27	−0.3	Su, St	Good
3181......	Apr. 8	0.0	Su, L	Good
3191......	Apr. 14	0.0	Su, L	Good
3201......	Apr. 15	+0.3	Su, St	Good
3268......	July 1	−0.4	Su, L	Good
3281......	July 8	+0.3	VB, Su	Good*
3292......	July 15	−0.1	Su, St	Good*

* On c exposure only.

No.	Diameter (Pl. 3268)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1............	0.20	−67	+36	+0.323
2............	.20	− 1	−80	.379
3............	.18	+67	+44	+0.298
Parallax star...	0.16	− 1.8	− 5.6	....

The sector was used for the parallax star. The mean magnitude of the comparison stars is about $10\frac{1}{2}$.

TABLE 2
REDUCTIONS FOR W.B. I, 16^h400

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	mm					
2514....	−0.050	0.8	+0.64	−278	+0.010	+0".10
2639....	.065	0.5	− .65	−193	.000	.00
2663....	.062	1.0	− .75	−185	+ .003	+ .03
2683....	.066	1.0	− .85	−176	− .001	− .01
3163....	.064	1.0	+ .85	+ 67	− .003	− .03
3181....	.068	1.0	+ .74	+ 79	− .007	− .07
3191....	.062	1.0	+ .67	+ 85	− .001	− .01
3201....	.061	1.0	+ .66	+ 86	.000	.00
3268....	.068	1.0	− .55	+163	− .004	− .04
3281....	.060	0.7	− .62	+170	+ .005	+ .04
3292....	−0.065	0.7	−0.70	+177	+0.005	+0.04

The normal equations are:

$$9.7\,c + 0.430\,\mu + 0.053\,\pi = -0.612$$
$$23.975 + 1.844 = -0.060$$
$$4.862 = +0.006$$

from which

$$c = -0.063$$
$$\mu = -0.0002 = -0".002 \qquad \mu_a = -0^s.0005$$
$$\pi = +0.0025 = +0".027 \pm 0".015$$

Probable error corresponding to unit weight,

$$\pm 0.0030 = \pm 0".032$$

No other determination of parallax is available for this star.

ζ Herculis $(16^h38^m, +31°47')$

This bright double star is Σ 2084. The magnitudes of the components are $2^M.8$ and $6^M.5$; the brighter one is of spectral class G. Only the brighter component appears on the plates. The period of the system is about 35 years, but during the time covered by the present series the relative motion can be assumed uniform, the deviation being less than $0".01$. For the center of gravity of the system Boss gives the following proper motion:

$$\mu = -0^s.0365 \qquad \mu' = +0".385$$

From a discussion of the meridian observations he also finds that the fainter component has a mass equal to 0.43 times the mass of the brighter star. The present series of plates is too short for a similar determination. The 18 plates were measured by Mr. Ván Biesbroeck.

TABLE 1
PLATES OF ζ HERCULIS

No.	Date	Hour Angle	Observers	Quality of Images
3293......	1917 July 15	$+0^h3$	Su, St	Fair
3311......	July 29	+0.2	Su, St	Good–Fair
3596......	1918 Feb. 21	−0.2	VB	Poor*
3604......	Feb. 26	−0.1	Su. P	Fair–Poor
3612......	Feb. 28	−0.3	VB, Su	Good†
3630......	Mar. 7	0.0	VB	Fair
3631......	Mar. 7	+0.2	VB	Fair*
3649......	Mar. 14	−0.5	Su, VB	Fair–Poor
3661......	Mar. 24	−0.4	VB, P	Fair
3814......	June 30	−0.2	VB, St	Good
3822......	July 2	−0.3	VB	Good
3833......	July 10	−0.1	VB, St	Good
3860......	July 20	−0.2	VB, St	Good
3868......	July 21	−0.4	VB, St	Good
4422......	1919 Mar. 6	−0.2	VB	Fair–Poor
4440......	Mar. 19	0.0	VB	Fair
4447......	Mar. 22	−0.4	VB	Good
4448......	Mar. 22	−0.1	VB	Good

* One exposure.
† Three exposures.

COMPARISON STARS

No.	Diameter (Pl. 4447)	X (Right Ascension)	Y (Declination)	Dependence
	mm	½ mm	½ mm	
1............	0.21	−290.9	+260.9	+0.281
2............	0.20	+ 83.9	+323.5	.227
3............	0.20	+ 70.4	−392.5	.254
4............	0.23	+136.6	−191.9	+0.238
Parallax star...	0.20	− 12.4	+ 1.1	....

The mean magnitude of the comparison stars is about 9.5. The apparent brightness of the parallax star has been reduced 7^M by means of the double rotating sector.

TABLE 2
REDUCTIONS FOR ζ HERCULIS

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{\overline{p.v}}$ in Arc
	½ mm					
3293....	−0.022	0.7	−0.690	−328	+0.009	+0″02
3311....	.057	0.9	− .826	−314	− .014	− .04
3596....	.081	0.3	+ .970	−107	+ .009	+ .01
3604....	.122	0.5	+ .980	−102	− .030	− .06
3612....	.096	1.2	+ .981	−100	− .003	− .01
3630....	.061	0.7	+ .978	− 93	+ .035	+ .08
3631....	.110	0.5	+ .978	− 93	− .014	− .03
3649....	.113	0.5	+ .960	− 86	− .012	− .02
3661....	.125	0.7	+ .904	− 76	− .017	− .04
3814....	.204	1.0	− .463	+ 22	+ .005	+ .01
3822....	.216	1.0	− .492	+ 24	− .005	− .01
3833....	.238	1.0	− .604	+ 32	− .019	− .05
3860....	.241	1.0	− .731	+ 42	− .012	− .03
3868....	.218	1.0	− .742	+ 43	+ .012	+ .03
4422....	.312	0.5	+ .979	+271	− .022	− .04
4440....	.278	1.0	+ .940	+284	+ .021	+ .05
4447....	.326	1.0	+ .924	+287	− .025	− .06
4448....	−0.292	1.0	+0.924	+287	+0.009	+0.02

The normal equations are:

$$14.2\,c + 1.482\,\mu + 2.983\,\pi = -2.595$$
$$46.640 + 7.405 = -2.496$$
$$9.780 = -0.598$$

from which

$$c = -0.181$$
$$\mu = -0.0533 = -0″.142 \qquad \mu_a = -0″.0407$$
$$\pi = +0.356 = +0″.095 \pm 0″.10$$

Probable error corresponding to unit weight,

$$\pm 0″.029$$

The other determinations are:

Parallax	Observer	Method
+0.172 ±0.040........	Smith	Heliometer
+0.101 ±0.024........	Russell	Photography
+0.146 ±0.029........	Flint	Meridian Circle
+0.086 ±0.004........	Miller	Photography
+0.066..............	Adams	Spectrum

41 Herculis (16^h39^m, $+6°17'$)

This seventh-magnitude star, β G.C. 7740, has a tenth magnitude companion at a distance of 163″, with the same proper motion. Separate determinations were made for both 41 Herculis and the companion. In Boss's *Preliminary General Catalogue* the following proper motion is given for the bright star: −0″.0146, −0″.277. The thirteen plates were measured by Miss Steele.

TABLE 1
PLATES OF 41 HERCULIS

No.	Date	Hour Angle	Observers	Quality of Images
2163......	1915 July 22	-0^h1	Su	Good
2493......	1916 Mar. 16	−0.3	Su, L	Fair
2510......	Apr. 9	−0.6	Su, L	Good
2521......	Apr. 23	+0.1	Su, L	Good
2528......	Apr. 27	0.0	Su, L	Good
2621......	July 3	0.0	Su, L	Fair
2640......	July 10	0.0	Su	Good
2646......	July 11	−0.3	Su, L	Good
2650......	July 13	−0.2	Su, L	Fair
2651†......	July 13	+0.2	Su, L	Fair*
3121......	1917 Feb. 27	−0.6	Su, St	Good*
3152......	Mar. 20	−0.2	Su, L	Good
3164......	Mar. 27	−0.1	Su, St	Fair

* One exposure only.
† Not used for the companion.

COMPARISON STARS

No.	Diameter (Pl. 2521)	X (Right Ascension)	Y (Declination)	Dependence for 41 Herculis	Dependence for the Companion
	mm	mm	mm		
1......	0.10	−47	+44	+0.252	+0.163
2......	0.17	−22	−68	.482	.628
3......	0.19	+69	+23	+0.266	+0.209
41 Herculis ..	0.14	− 4.1	−15.2	....	....
Companion ...	0.20	− 7.0	−30.2	....	....

The sector was used for 41 Herculis. The mean magnitude of the comparison stars is about $10\frac{1}{2}$.

TABLE 2

REDUCTIONS FOR 41 HERCULIS

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	mm					
2163....	−0.026	1.0	−0.74	−356	+0.001	+0.01
2493....	.044	0.7	+ .96	−118	− .004	− .03
2510....	.038	1.0	+ .78	− 94	+ .003	+ .03
2521....	.038	1.0	+ .61	− 80	+ .003	+ .03
2528....	.043	1.0	+ .56	− 76	− .001	− .01
2621....	.048	0.7	− .51	− 9	− .001	− .01
2640....	.048	1.0	− .59	− 2	.000	.00
2646....	.047	1.0	− .60	− 1	+ .001	+ .01
2650....	.050	0.7	− .64	+ 1	− .002	− .02
2651....	.049	0.5	− .64	+ 1	− .001	− .01
3121....	.060	0.7	+ .98	+230	+ .001	+ .01
3152....	.056	1.0	+ .94	+251	+ .005	+ .05
3164....	−0.065	0.8	+0.88	+258	−0.004	−0.04

The normal equations are:

$$11.1 \, c - 0.783 \, \mu + 1.897 \, \pi = -0.514$$
$$+31.085 + 5.990 = -0.139$$
$$+6.045 = -0.118$$

from which

$$c = -0.047$$
$$\mu = -0.0058 = -0''062 \qquad \mu_a = -0^s0152$$
$$\pi = +0.0010 = +0''011 \pm 0''010$$

Probable error corresponding to unit weight,

$$\pm 0.0019 = \pm 0''020$$

TABLE 2

REDUCTIONS FOR COMPANION OF 41 HERCULIS

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	mm					
2163....	−0.041	1.0	−0.74	−356	0.000	0.00
2493....	.055	0.7	+ .96	−118	− .003	− .03
2510....	.052	1.0	+ .78	− 94	+ .001	+ .01
2521....	.052	1.0	+ .61	− 80	+ .002	+ .02
2528....	.056	1.0	+ .56	− 76	− .002	− .01
2621....	.057	0.7	− .51	− 9	+ .003	+ .03
2640....	.061	1.0	− .59	− 2	+ .001	+ .01
2646....	.062	1.0	− .60	− 1	− .002	− .02
2650....	.060	0.7	− .64	+ 1	.000	.00
3121....	.069	0.7	+ .98	+230	+ .001	+ .01
3152....	.070	1.0	+ .94	+251	+ .001	+ .01
3164....	−0.074	0.8	+0.88	+258	−0.003	−0.03

The normal equations are:

$$10.6 \, c - 0.788 \, \mu + 2.217 \, \pi = -0.621$$
$$31.085 + 5.993 = -0.107$$
$$5.840 = -0.155$$

from which

$$c = -0.059$$
$$\mu = -0.0052 = -0''056 \qquad \mu_a = -0^s0137$$
$$\pi = +0.0013 = +0''014 \pm 0''007$$

Probable error corresponding to unit weight,

$$\pm 0.0013 = \pm 0''014$$

The resulting parallax for the system of the two stars would be $+0''013 \pm 0''006$. No other determination of parallax is available for either of the stars.

β G.C. 7783 $(16^h48^m, +28°50')$

This 7^M star is Σ 2107, a binary that has been measured continuously since 1829. The elements are still very uncertain because the period is probably more than two centuries. Struve gives 1^M5 for the difference in brightness between the two components. Only the brighter one appears on the plates, where the parallax star is reduced in brightness by means of the rotating sector.

The twenty plates of this field were measured by Mr. Van Biesbroeck.

TABLE 1

PLATES OF β G.C. 7783

No.	Date	Hour Angle	Observers	Quality of Images
3662.......	1918 Mar. 24	−0ʰ1	VB, P	Fair
3668.......	Mar. 26	−0.2	P, VB	Fair
3672.......	Mar. 27	−0.2	VB, Su	Fair
3673.......	Mar. 27	+0.2	VB, Su	Good*
3702.......	Apr. 9	+0.2	P, VB	Good
3815.......	June 30	0.0	VB, St	Good*
3823.......	July 2	+0.2	VB	Good*
3834.......	July 10	0.0	VB, St	Poor
3861.......	July 20	0.0	VB	Good
3862.......	July 20	+0.3	St	Good
3869.......	July 21	−0.2	VB	Fair
3870.......	July 21	0.0	St	Fair
3873.......	July 24	+0.1	VB	Good
3874.......	July 24	+0.3	St	Good
4441.......	1919 Mar. 19	+0.1	VB	Poor
4449.......	Mar. 22	0.0	VB	Good*
4450.......	Mar. 22	+0.2	VB	Good
4461.......	Mar. 27	−0.3	P, HP	Fair
4464.......	Apr. 1	−0.2	HP	Poor
4465.......	Apr. 1	0.0	P	Poor

* Three exposures.

COMPARISON STARS

No.	Diameter (Pl. 3672)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1.............	0.25	−27.2	−37.7	+0.319
2.............	.22	− 7.2	+81.0	.342
3.............	.21	+34.4	−43.3	+0.330
Parallax star...	0.24	+ 5.4	+10.1	....

The mean magnitude of the comparison stars is 9½. The rotating sector reduced the apparent brightness of the parallax star by about three magnitudes.

TABLE 2

REDUCTIONS FOR β G.C. 7783

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p}.v$ in Arc
	mm					
3662....	+0.007	0.7	+0.922	−162	+0.003	+0."03
3668....	+ .010	0.7	+ .910	−160	+ .006	+ .05
3672....	− .002	0.7	+ .903	−159	− .006	− .05
3673....	+ .004	1.2	+ .903	−159	.000	.00
3702....	.001	1.0	+ .794	−146	− .003	− .03
3815....	.002	1.2	− .439	− 64	− .002	− .02
3823....	.007	1.2	− .468	− 64	+ .003	+ .04
3834....	.000	0.5	− .583	− 54	− .003	− .02
3861....	.004	1.0	− .710	− 44	.000	.00
3862....	.008	1.0	− .710	− 44	+ .004	+ .04
3869....	.005	0.7	− .722	− 43	+ .001	+ .01
3870....	.000	0.7	− .722	− 43	− .004	− .04
3873....	.001	1.0	− .756	− 40	− .003	− .03
3874....	.005	1.0	− .756	− 40	+ .001	+ .01
4441....	.012	0.5	+ .940	+198	+ .004	+ .03
4449....	.008	1.2	+ .940	+201	.000	.00
4450....	.003	1.0	+ .940	+201	− .005	− .05
4461....	.010	0.7	+ .905	+206	+ .002	+ .02
4464....	.014	0.5	+ .876	+211	+ .006	+ .05
4465....	+0.003	0.5	+0.876	+211	−0.005	−0.04

The constant 4.800 was subtracted from all the values of m in order to use only small numbers.

The normal equations are:

$$17.0c - 1.859\,\mu + 2.522\,\pi = +0.084$$
$$30.932 \quad + 4.812 \quad = +0.026$$
$$10.638 \quad = +0.020$$

from which

$$c = +0.005$$
$$\mu = +0.00111 = +0."0118 \qquad \mu_a = +0."0060$$
$$\pi = +0.0020 = +0."021 \pm 0."008$$

Probable error corresponding to unit weight,

$$\pm 0."024.$$

The only other determination published is by Miller, from photographs at the Sproul Observatory:

$$+0."006 \pm 0."006$$

Lalande 31055 (17^h0^m, $-4°54'$)

This star is B.D. −4°4225, of magnitude 7.5. The interval of time covered by the observations for parallax is short and the reduction has been made after assuming the proper motions as given by Boss, viz.: −0."0611 and −1."147. The measures are by Mr. Lee.

TABLE 1

PLATES OF LALANDE 31055

No.	Date	Hour Angle	Observers	Quality of Images
2009......	1915 Mar. 11	−0ʰ1	Su, L	Poor
2021......	Mar. 17	−0.3	Su, J	Fair
2501......	1916 Apr. 2	−0.2	Su, L	Good
2515......	Apr. 16	−0.1	Su, L	Fair
2641......	July 10	+0.3	Su	Fair
2647......	July 11	−0.2	Su, L	Good
2648......	July 11	+0.2	Su, L	Good
2671......	July 20	−0.3	Su, L	Good
2698......	Aug. 3	+0.4	Su, L	Poor

COMPARISON STARS

No.	Diameter Pl. 2671	X (Right Ascension)	Y (Declination)	Dependence
	mm	½ mm	½ mm	
1.............	0.16	−345	+231	+0.214
2.............	.24	− 89	−278	.219
3.............	.14	+137	+196	.283
4.............	.23	+297	−149	+0.284
Parallax star...	0.18	+ 29.8	+ 1.6	....

The average magnitude of the comparison stars is about 11. The sector was used.

TABLE 2

REDUCTION FOR LALANDE 31055

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p}.v$ in Arc
	½ mm					
2009....	+0.190	0.6	+0.986	−367	+0.017	+0."04
2021....	.182	0.6	+ .974	−361	+ .010	+ .02
2501....	.169	0.7	+ .888	+ 21	− .002	.00
2515....	.147	0.7	+ .760	+ 35	− .022	− .05
2641....	.150	0.6	− .536	+120	+ .006	+ .01
2647....	.133	1.0	− .550	+121	− .011	− .03
2648....	.131	0.7	− .550	+121	− .013	− .03
2671....	.150	1.0	− .669	+130	+ .008	+ .02
2698....	+0.158	0.4	−0.825	+144	+0.020	+0.03

The normal equations are:

$$6.3\,c + 0.074\,\pi = +0.972$$
$$3.515 \quad = +0.078$$

whence

$$c = +0.154$$
$$\pi = +0.0189 = +0."050 \pm 0."012$$

Probable error corresponding to unit weight,

$$\pm 0.0082 = \pm 0."022$$

The following parallaxes have been published:

Flint . . . . $+0\overset{''}{.}11 \pm 0\overset{''}{.}03$
Smith . . . . $+0\overset{''}{.}051 \pm 0\overset{''}{.}014$

77 χ Herculis (17^{h}24^m, +48°21′)

Boss gives a proper motion of 0^{s}000, −0$\overset{''}{.}$015 for this 5.8 magnitude star. The spectral type is A. The ten plates were measured by Mrs. Pettit.

TABLE 1

PLATES OF 77 χ HERCULIS

No.	Date	Hour Angle	Observers	Quality of Images
1553	1914 Apr. 9	−1^{h}0	Su, L	Fair*
1563	Apr. 12	−0.4	Su, Sl	Fair
2164	1915 July 22	−0.2	Su, Su	Good
2672	1916 July 20	−0.1	Su, L	Good
3216	1917 May 6	−0.2	Su, L	Good
3875	1918 July 24	0.0	VB, St	Good
3895	July 31	+0.1	VB, St	Fair
3908	Aug. 3	−0.1	VB, St	Good
4451	1919 Mar. 22	−0.1	VB	Good
4462	Mar. 27	−0.1	P, HP	Fair

* One exposure only.

COMPARISON STARS

No.	Diameter (Pl. 2672)	X (Right Ascension)	Y (Declination)	Dependence
	mm	¼ mm	¼ mm	
1	0.14	−310	−321	+0.169
2	.20	−234	−217	.200
3	.16	+ 12	+157	.329
4	.17	+186	+226	.248
5	.16	+346	+155	+0.054
Parallax star . . .	0.21	− 30.2	+ 18.5	. . . .

The sector was used for the parallax star. The mean magnitude of the comparison stars is about 10.

TABLE 2

REDUCTIONS FOR 77 χ HERCULIS

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	¼ mm					
1553	+0.169	0.5	+0.88	−1076	+0.010	+0$\overset{''}{.}$02
1563	.150	0.6	+ .86	−1073	− .009	− .02
2164	.162	1.0	− .61	− 607	+ .008	+ .02
2672	.147	1.0	− .59	− 243	− .007	− .02
3216	.158	1.0	+ .59	+ 47	.000	.00
3875	.148	1.0	− .63	+ 491	− .006	− .02
3895	.152	0.8	− .72	+ 498	− .001	.00
3908	.159	0.9	− .76	+ 501	+ .006	+ .02
4451	.156	0.9	+ .97	+ 732	− .003	− .01
4462	+0.167	0.8	+0.96	+ 737	+0.008	+0.02

The normal equations are:

$8.5\,c+\;\;6.039\,\mu+0.097\,\pi = +1.329$
$\qquad\quad\; 328.156\;\; −2.195\;\;\; = +0.922$
$\qquad\qquad\qquad\quad\; 4.815\;\;\; = +0.032$

from which

$c = +0.156$
$\mu = \;\;0.0000 = 0\overset{''}{.}000 \qquad\qquad \mu_a = 0\overset{s}{.}000$
$\pi = +0.0035 = +0\overset{''}{.}009 \pm 0\overset{''}{.}006$

Probable error corresponding to unit weight,

$$\pm 0.0047 = \pm 0\overset{''}{.}013$$

No other determination of parallax is available for this star.

β G.C. 8038 (17^{h}25^m, −0°59′)

Σ 2173 has a period of about 45 years. During the time covered by the plates the distance was very small. The measures therefore refer to the center of gravity of the two components which differ by 0^{M}3 only.

The total magnitude is 5^{M}3 and the spectral type G. A proper motion of

$$\mu = −0\overset{s}{.}0083 \qquad \mu' = −0\overset{''}{.}175$$

is given in Boss's *Preliminary General Catalogue*. The eleven plates were measured by Mrs. Pettit.

TABLE 1

PLATES OF β G.C. 8038

No.	Date	Hour Angle	Observers	Quality of Images
2037	1915 Mar. 28	−0^{h}1	Su, L	Good
2161	July 21	+0.6	Su	Good
2512	1916 Apr. 9	−0.4	Su, L	Good
2529	Apr. 27	−0.4	Su, L	Fair
3357	1917 Aug. 26	+0.6	Su, St	Fair
3711	1918 Apr. 11	−0.1	Su, P	Fair*
3721	Apr. 14	−0.1	P, VB	Fair*
3727	Apr. 30	−0.2	VB, P	Fair
3883	July 25	+0.2	VB, St	Poor
3928	Aug. 14	+0.1	VB	Fair*
3930	Aug. 18	+0.2	VB, St	Poor

* One exposure only.

COMPARISON STARS

No.	Diameter (Pl. 2512)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1	0.24	−90	−68	+0.164
2	.17	−35	+53	.093
3	.18	− 1	−49	.257
4	.29	+51	+50	.207
5	.16	+75	+15	+0.279
Parallax star . . .	0.28	+13.3	− 4.4	. . . .

The sector was used for the parallax star. The mean magnitude of the comparison stars is about 10½.

<div style="columns:2">

TABLE 2
REDUCTIONS FOR β G.C. 8038

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	mm					
2037....	+0.053	0.7	+0.96	−798	−0.004	−0".04
2161....	.048	0.8	− .60	−683	+ .004	+ .04
2512....	.049	0.9	+ .88	−420	+ .002	+ .02
2529....	.043	0.8	+ .69	−402	− .001	− .01
3357....	.012	0.7	− .95	+ 84	− .009	− .08
3711....	.025	0.6	+ .87	+312	.000	.00
3721....	.022	0.4	+ .84	+315	− .003	.02
3727....	.025	0.6	+ .66	+331	+ .001	+ .01
3883....	.021	0.5	− .65	+387	+ .007	+ .05
3928....	.018	0.4	− .86	+437	+ .006	+ .04
3930....	+0.007	0.5	−0.91	+441	−0.004	−0.03

The normal equations are:

$$6.9 \, c - \quad 6.452 \, \mu + 1.001 \, \pi = +0.222$$
$$152.428 \quad -8.959 \quad = -0.662$$
$$4.561 \quad = +0.082$$

from which

$$c = +0.029$$
$$\mu = -0.0028 = -0".030 \qquad \mu_a = -0^s.007$$
$$\pi = +0.0063 = +0".067 \pm 0".015$$

Probable error corresponding to unit weight,

$$\pm 0.0028 = \pm 0".030$$

No other parallax is available for this star.

26 Draconis (17^h34^m, $+61°57'$)

For this $5^M.3$ star, which is also β G.C. 8099, Porter gives a proper motion of $+0^s.035$, $-0".50$ (*Publications of the Cincinnati Observatory*, No. 12, p. 172). It has a 10^M companion which shows a decided orbital motion, although the period is still undeterminate. The plates do not show the companion. The spectral type is F. The ten plates were measured by Mrs. Pettit.

TABLE I
PLATES OF 26 DRACONIS

No.	Date	Hour Angle	Observers	Quality of Images
227.......	1910 Mar. 12	−1ʰ5	Su, Sl	Good
234.......	Mar. 20	−0.6	Su, Sl	Good
819.......	1912 July 14	−0.8	Su, Sl	Good
1199.......	1913 Apr. 19	−0.8	Su, Sl	Poor
1326.......	July 26	−0.6	Su, M	Good
1540.......	1914 Mar. 19	−0.5	Su, Sl	Good
2652.......	1916 July 13	−0.3	Su, L	Good
2707.......	Aug. 8	−0.4	Su, L	Fair
2708.......	Aug. 8	−0.1	Su, L	Good
4474.......	1919 Apr. 17	−0.1	P, HP	Fair

COMPARISON STARS

No.	Diameter	X (Right Ascension)	Y (Declination)	Dependence
	mm	½ mm	½ mm	
1.............	0.20	−345	+ 20	+0.250
2.............	.16	−176	+119	.280
3.............	.11	+232	+105	.283
4.............	.22	+289	−244	+0.187
Parallax star...	0.20	− 24.8	+ 35.4	....

The mean magnitude of the comparison stars is about $10\frac{1}{2}$. The rotating sector was used for reducing the apparent brightness by about five magnitudes.

TABLE 2
REDUCTIONS FOR 26 DRACONIS

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	½ mm					
227....	−9.484	0.8	+0.98	−1501	+0.017	+0".04
234....	9.504	1.0	+ .99	−1493	− .006	− .02
819....	9.332	1.0	− .47	− 646	+ .003	+ .01
1199....	9.221	0.5	+ .81	− 367	− .010	− .02
1326....	9.247	1.0	− .05	− 269	− .004	− .01
1540....	9.124	1.0	+ .99	− 33	− .008	− .02
2652....	8.972	0.9	− .46	+ 814	− .020	− .05
2707....	8.954	0.8	− .80	+ 840	+ .005	+ .01
2708....	8.949	1.0	− .80	+ 840	+ .010	+ .03
4474....	−8.626	0.7	+0.84	+1822	+0.010	+0.02

The normal equations are:

$$8.7 \, c - \quad 3.053 \, \mu + 0.783 \, \pi = -79.629$$
$$877.976 \quad -28.330 \quad = +49.782$$
$$5.536 \quad = - 7.683$$

from which

$$c = -9.147$$
$$\mu = +0.0262 = +0".070 \qquad \mu_a = +0^s.0362$$
$$\pi = +0.0401 = +0".107 \pm 0".010$$

Probable error corresponding to unit weight,

$$\pm 0.0079 \pm = 0".021$$

The following values have been obtained:

Parallax	Observer	Method
+0".077 ±0".036........	Chase	Heliometer
+0.09		
+0.076	Adams	Spectrum
+0.080 ±0.016........	Miller	Photography

</div>

Barnard's Proper Motion Star (17^{h}53^m, +4°25′)

According to Seares the photo-visual magnitude is 9.67, the photographic magnitude 11.43, corresponding to a color-index of 1^{M}76. Campbel found that the spectrum is of type Mb.

Owing to the unusual proper motion, exceptional precautions had to be taken in this case. In order to avoid in the measures in right ascension a component of the large proper motion in declination, the plates were lined up carefully, with reference to the equinox of 1900.0, by means of the rectilinear co-ordinates of the comparison stars as found in the Toulouse Zone of the *Astrographic Catalogue*. Hence the value of the proper motion obtained is referred to the same equinox. The computations were carried to 0″.001; the proper motion being about 0″.03 a day, it was necessary to get the dates of the plates to a fraction of a day and also to use three decimal places in the parallax factors. The large proper motion also produces an appreciable change in the values of the dependences. These have been computed for the first and the last plate of the series; the means of the two sets have been adopted in the reductions. The 17 plates of this field were measured by Mr. Van Biesbroeck.

TABLE 1
PLATES OF BARNARD'S PROPER-MOTION STAR

No.	Date	Hour Angle	Observers	Quality of Images
2685....	1916 July 27.40	0^{h}0	Su, L	Poor–Good
2699....	Aug. 3.40	+0.1	Su, L	Poor
2724....	Aug. 22.32	−0.2	Su, L	Good
2725....	Aug. 22.23	+0.2	Su, L	Poor–Fair
3217....	1917 May 6.62	0.0	Su, L	Good
3226....	May 13.59	−0.1	Su, L	Good
3313....	July 29.38	−0.2	Su, St	Fair
3344....	Aug. 15.33	−0.2	VB, Su	Fair
3352....	Aug. 22.33	0.0	VB, Su	Fair
3674....	1918 Mar. 27.71	−0.4	VB, Su	Fair
3675....	Mar. 27.72	−0.2	VB	Fair
3686....	Mar. 28.71	−0.4	P, P	Fair
3687....	Mar. 28.72	−0.2	VB	Fair
3877....	July 24.41	+0.2	VB, St	Good
3910....	Aug. 3.38	+0.2	VB,	Good
3924....	Aug. 10.36	0.0	VB, St	Good
3929....	Aug. 14.35	0.0	VB, St	Fair

COMPARISON STARS

No.	DIAMETER (Pl.3226)	X (RIGHT ASCENSION)	Y (DECLINATION)	DEPENDENCES Plate 2685	DEPENDENCES Plate 3929	DEPENDENCES Adopted
	mm	mm	mm			
1.........	0.21	−38.8	+55.8	+0.277	+0.289	+0.283
2.........	.31	−12.1	+ 0.8	0.242	0.240	0.241
3.........	.18	+ 5.5	−64.4	0.190	0.170	0.180
4.........	.25	+45.4	+ 7.8	+0.292	+0.301	+0.296
Parallax star.....	0.27	+ 0.5	+ 6.7	....	....	....

The mean magnitude of the comparison stars is about 10.

TABLE 2
REDUCTIONS FOR BARNARD'S PROPER MOTION STAR

PLATE	SOLUTION (m)	SOLUTION (m′)	WEIGHT (p)	PARALLAX FACTOR (P)	TIME IN DAYS (t)	$\sqrt{\overline{p\cdot v}}$ IN ARC
	mm	mm				
2685...	+0.0970	+0.0043	0.7	−0.599	−427.6	+0″03
2699...	+ .0897	+ .0027	0.4	− .690	−420.6	+0.01
2724...	+ .0749	+ .0009	1.0	− .885	−401.7	−0.01
2725...	+ .0792	+ .0052	0.6	− .885	−401.7	+0.03
3217...	+ .1046	− .0039	1.2	+ .680	−144.4	−0.03
3226...	+ .1026	− .0003	1.0	+ .589	−137.4	0.00
3313...	+ .0282	− .0010	0.7	− .622	− 60.6	−0.03
3344...	+ .0160	− .0004	0.7	− .820	− 43.7	−0.03
3352...	+ .0145	+ .0024	0.7	− .882	− 36.7	−0.01
3674...	+ .0084	− .0003	0.7	+ .988	+180.7	+0.01
3675...	+ .0688	+ .0001	0.7	+ .988	+180.7	+0.01
3686...	+ .0679	− .0005	0.7	+ .985	+181.7	−0.01
3687...	+ .0699	+ .0015	0.7	+ .985	+181.7	+0.02
3877...	− .0285	− .0001	1.2	− .550	+299.4	−0.03
3910...	− .0344	+ .0044	1.2	− .684	+309.4	+0.02
3924...	− .0391	+ .0030	1.2	− .765	+316.4	0.00
3929...	−0.0383	+0.0066	0.9	−0.807	+320.4	+0.03

The values of m' are deduced from m by adopting the provisional values

$$\pi = +0.0500; \quad \mu = -0.00017; \quad c = +0.0500$$

The corrections are deduced from the following normal equations:

$$14.3\,\Delta c + 3.846\,\Delta\mu - 2.696\,\Delta\pi = +0.0191$$
$$103.236\,\Delta\mu + 2.695\,\Delta\pi = +0.0207$$
$$8.820\,\Delta\pi = -0.0211$$

whence

$$\Delta\pi = -0.002196; \quad \Delta\mu = +0.00000226$$
$$\Delta c = +0.0009$$
$$\mu = -0.00016774 = -0″.00179$$
$$\mu_a = -0^s.0436 \text{ per year}$$
$$\pi = +0.047804 = +0″.509 \pm 0″.006$$

Probable error corresponding to unit weight,

$$\pm 0″.016$$

Preliminary values for the parallax have been published by Adams (0″.2), Russell (0″.70), Schlesinger (0″.50), Mitchell (0″.47), Gonnessiat (1″.00), Lee (0″.52). There is also a very uncertain estimate by Comas Sola (0″.418). Final solutions are given as follows:

Van Maanen .... +0″.519 ± 0″.006
L. Sayer .... +0.557 ± 0.016

3 α Lyrae (Vega) (18h34m, +38°41′)

This bright A star has a total proper motion of 0″.35 a year. All the plates of this field have been taken with the double rotating sector, the exposure time being from four to five minutes. The small proper motion in right ascension deduced from this short series of plates agrees well with the value

$$\mu_a = +0\overset{s}{.}0174$$

given in Boss's *Preliminary General Catalogue*.

The 17 plates of this star were measured by Mr. Van Biesbroeck.

TABLE 1
PLATES OF 3 α LYRAE

No.	Date	Hour Angle	Observers	Quality of Images
2518......	1916 Apr. 16	−0h.2	Su, L	Fair
2532......	Apr. 27	+0.1	Su, Su	Good
2538......	May 4	−0.5	Su, L	Good
2541......	May 10	−0.4	VB, Su	Fair–Poor
2696......	Aug. 1	−0.3	Su, L	Poor
2711......	Aug. 8	−0.1	Su, L	Fair
2726......	Aug. 22	−0.2	Su, L	Fair
2739......	Aug. 29	−0.3	Su, L	Good
3218......	1917 May 6	−0.1	Su, L	Good
3232......	May 22	0.0	Su, L	Poor–Good
3353......	Aug. 22	−0.3	VB, Su	Fair
3705......	1918 Apr. 9	−0.5	P, VB	Poor
3709......	Apr. 10	−0.5	Su, VB	Fair
3714......	Apr. 13	−0.4	VB	Fair–Good
3940......	Aug. 21	0.0	VB, St	Fair
3947......	Aug. 22	0.0	VB, St	Fair
3979......	Aug. 31	+0.1	VB, St	Good

COMPARISON STARS

No.	Diameter (Pl. 3970)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1.............	0.11	−104.7	−20.4	+0.173
2.............	.11	− 52.4	+27.2	.136
3.............	.16	− 12.5	+26.1	.141
4.............	.15	+ 38.2	−33.7	.202
5.............	.12	+ 55.0	− 1.8	.175
6.............	.14	+ 75.5	+ 2.5	+0.173
Parallax star...	0.16	+ 3.6	− 2.8	....

The mean magnitude of the comparison stars is about 10.

TABLE 2
REDUCTIONS FOR 3 α LYRAE

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p} \cdot v$ in Arc
	½ mm					
2518....	+0.102	0.7	+0.040	−387	−0.030	−0″.06
2532....	.112	1.0	+ .865	−376	− .018	− .05
2538....	.142	1.0	+ .808	−369	+ .013	+ .03
2541....	.142	0.6	+ .744	−363	+ .015	+ .03
2696....	.056	0.4	− .532	−280	− .032	− .05
2711....	.101	0.7	− .628	−273	+ .016	+ .03
2726....	.112	0.7	− .793	−259	+ .031	+ .06
2739....	.065	1.0	− .859	−252	− .014	− .03
3218....	.192	1.0	+ .790	− 2	− .006	− .01
3232....	.206	0.7	+ .597	+ 14	+ .013	+ .03
3353....	.160	0.7	− .790	+106	+ .010	+ .02
3705....	.296	0.4	+ .979	+336	+ .026	+ .04
3709....	.250	0.7	+ .975	+337	− .020	− .04
3714....	.269	0.8	+ .964	+340	− .001	.00
3940....	.222	0.7	− .771	+470	+ .002	.00
3947....	.200	0.9	− .788	+471	− .019	− .05
3970....	+0.222	1.0	−0.872	+480	+0.004	+0.01

Normal equations:

$$13.0\ c - 0.129\ \mu + 0.860\ \pi = +2.1613$$
$$145.819 - 9.394 = +2.3459$$
$$8.545 = +0.3274$$

whence

$$c = -0.1636$$
$$\mu = +0.0190 = +0\overset{s}{.}0506 \quad \mu_a = +0\overset{s}{.}0159 \text{ per year}$$
$$\pi = +0.0427 = +0\overset{s}{.}114 \pm 0\overset{s}{.}010$$

Probable error corresponding to unit weight,

$$\pm 0\overset{s}{.}027$$

The latest visual determinations of the parallax are:

Elkin.............	+0″.082 ±0.016
Flint..............	+0.10 ±0.03
Jewdokimov........	+0.08 ±0.087

No other photographic determinations have been published.

27 b′ Cygni (20h3m, +35°42′)

Boss gives a proper motion of −0″.0190, −0″.438 (*Preliminary General Catalogue*, pp. 208–9) for this 5.5 magnitude star. The spectral type is K. The 14 plates were measured by Mr. Pettit.

TABLE 1
PLATES OF 27 b′ CYGNI

No.	Date	Hour Angle	Observers	Quality of Images
2270......	1915 Oct. 3	−0h.4	L	Poor
2295......	Oct. 20	0.0	L	Good
2307......	Oct. 21	+0.1	VB, L	Fair
2566......	1916 May 30	−0.1	Su, L	Good
2567......	May 30	+0.1	Su, L	Fair
2588......	June 15	−0.1	Su, L	Good
2589......	June 15	+0.1	L, Su	Good
2591......	June 18	0.0	Su, L	Good
2592......	June 18	+0.2	Su, L	Good
2729......	Aug. 22	−0.2	Su, L	Good
2730......	Aug. 22	0.0	Su, L	Fair
3373......	1917 Aug. 29	0.0	VB, Su	Good
3384......	Sept. 2	−0.2	Su, St	Poor
3412......	Sept. 23	+0.1	Su, St	Fair

COMPARISON STARS

No.	Diameter (Pl. 2729)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1.............	0.15	+73	+60	+0.193
2.............	.12	+42	+28	.182
3.............	.15	+35	−53	.178
4.............	.13	−36	−59	.153
5.............	.17	−54	+59	.149
6.............	.19	−60	−34	+0.145
Parallax star...	0.15	+ 5.7	+ 2.0	....

The mean magnitude of the comparison stars is about 10½. A reduction of five magnitudes in

the apparent brightness of the parallax star was obtained by the sector.

TABLE 2
REDUCTIONS FOR 27 b' CYGNI

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	mm					
2270....	+0.013	0.6	−0.93	−271	−0.002	−0″.02
2295....	+ .011	0.9	− .97	−254	− .002	− .02
2307....	+ .014	0.8	− .98	−253	+ .001	+ .01
2566....	+ .007	1.0	+ .75	− 31	.000	.00
2567....	+ .007	0.6	+ .75	− 31	.000	.00
2588....	+ .003	1.0	+ .56	− 15	− .002	− .02
2589....	+ .004	0.9	+ .56	− 15	− .001	− .01
2591....	+ .004	1.0	+ .52	− 12	− .001	− .01
2592....	+ .003	1.0	+ .52	− 12	+ .003	+ .03
2729....	− .001	1.0	− .51	+ 53	+ .002	+ .02
2730....	− .003	0.5	− .51	+ 53	.000	.00
3373....	− .029	0.7	− .45	+425	− .003	− .03
3384....	− .030	1.0	− .64	+429	− .003	− .03
3412....	−0.025	0.7	−0.87	+450	+0.004	+0.04

The normal equations are:

$$11.7\,c + 4.253\,\mu - 1.240\,\pi = −0.012$$
$$61.201\ \ −2.175\ \ = −0.375$$
$$5.643\ \ = +0.035$$

from which

$$c = +0.002$$
$$\mu = −0.0061 = −0″.065 \qquad \mu_a = −0″.0195$$
$$\pi = +0.0042 = +0″.045 \pm 0″.007$$

Probable error corresponding to unit weight,

$$\pm 0.0015 = \pm 0″.016$$

The parallax 0″.032 has been obtained by Adams from the spectrum.

β Delphini (20ʰ33ᵐ, +14°15′)

This rapid binary, which is β G.C. 10363, has a period of about 27 years. Spectral type, F 5. Total magnitude 3.7. The first seven plates of this field were obtained by giving three short exposures on the parallax star. The double rotating sector was used for the three last plates. During the time covered by these plates the orbital motion was very small in right ascension; without appreciable error this motion can be assumed to be uniform. The fainter companion of this binary does not appear on the plates. The ten plates were measured by Mr. Van Biesbroeck.

TABLE 1
PLATES OF β DELPHINI

No.	Date	Hour Angle	Observers	Quality of Images
1682.......	1914 Sept. 26	0ʰ0	Su, L	Good
1692.......	Oct. 1	0.0	Su, J	Good
1711.......	Oct. 11	−0.2	L, J	Good
2108.......	1915 June 13	−0.1	Su, J	Good
2114.......	June 16	+0.4	Su, L	Good
2123.......	June 26	+0.2	Su, L	Poor
2124.......	June 26	+0.6	Su, L	Fair
2753.......	1916 Sept. 12	+0.6	Su, St	Fair
2756.......	Sept. 14	−0.2	Su, L	Fair
2759.......	Sept. 17	−0.5	Su, St	Good

COMPARISON STARS

No.	Diameter (Pl. 2759)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1.............	0.17	−65.3	−36.1	+0.151
2.............	.19	−46.8	−23.8	.154
3.............	.16	−46.6	−54.2	.177
4.............	.19	+13.3	−19.4	.190
5.............	.17	+61.3	+50.1	.169
6.............	.17	+84.1	+83.4	+0.159
Parallax star...	0.16	+ 0.9	− 0.5	....

The mean magnitude of the comparison stars is about 10½.

TABLE 2
REDUCTIONS FOR β DELPHINI

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	½ mm					
1682....	−0.181	1.0	−0.815	−325	+0.006	+0″.02
1692....	.195	1.0	− .856	−320	− .008	− .02
1711....	.185	1.0	− .919	−310	+ .002	+ .01
2108....	.125	1.0	+ .681	− 65	+ .005	+ .01
2114....	.130	1.0	+ .645	− 62	.000	.00
2123....	.136	0.4	+ .513	− 52	− .005	− .01
2124....	.136	0.7	+ .513	− 52	− .005	− .01
2753....	.106	0.7	− .677	+392	− .012	− .03
2756....	.093	0.7	− .699	+394	+ .001	.00
2759....	−0.086	1.0	−0.732	+397	+0.008	+0.02

Normal equations:

$$8.5\,c − 1.920\,\mu − 2.395\,\pi = −1.1909$$
$$68.901\,\mu + 0.409\,\pi = +1.1366$$
$$4.609\,\pi = +0.03974$$

whence

$$c = −0.1327$$
$$\mu = +0.01270 = +0″.0338 \qquad \mu_a = +0″.0085$$
$$\pi = +0.01617 = +0″.043 \pm 0″.006$$

Probable error corresponding to unit weight,

$$\pm 0″.012$$

Other determinations of the parallax of β Delphini are:

Parallax	Observer	Method
$\begin{matrix}-0\overset{..}{.}13\\-0.02\end{matrix}\Big\}\pm0\overset{..}{.}027\dots$	Flint	Meridian Circle
$+0.008\pm0.008\dots$	Mitchell	Photography
$+0.016\pm0.011\dots$	Miller and Steele	Photography
$+0.038\dots$	Adams	Spectrum

Lalande 40728 $(20^h56^m, 39°52')$

This $6^M.9$ star is also Grb. 3357; it has a yearly proper motion of $0''.32$, viz.:

In right ascension,

$+0^s.0196,$　　Dyson and Thackeray

$+0.0199,$　　Porter

In declination,

$+0.209,$　　Dyson and Thackeray

$+0.215,$　　Porter

The 17 plates were measured by Mr. Pettit, who found that one of the comparison stars used at first had an appreciable proper motion. This star was discarded as a comparison star and measured separately for parallax. (See next star.)

TABLE 1
PLATES OF LALANDE 40728

No.	Date	Hour Angle	Observers	Quality of Images
1735	1914 Oct. 22	0^h0	L, J	Fair
1768	Oct. 31	+0.1	J	Fair–Good
1772	Nov. 1	−0.1	L, J	Fair–Good
2119	1915 June 24	+0.2	Su, J	Fair–Good
2132	June 30	0.0	Su, L	Poor
2263	Sept. 29	+0.1	Su, VB	Fair–Good
2271	Oct. 3	−0.6	VB, VB	Good
2281	Oct. 10	−0.1	VB, Su	Good
2579	1916 June 11	−0.1	Su, L	Good
2580	June 16	0.0	L	Fair–Good
2608	June 26	−0.1	Su, Y	Fair–Poor
2757	Sept. 14	+0.1	Su, St	Fair–Poor
2786	Sept. 24	+0.2	Su, St	Poor–Fair
3249	1917 June 13	−0.4	Su, St	Fair
3255	June 17	+0.1	Su, St	Good–Fair
3439	Nov. 4	+0.1	VB, St	Good
3445	Nov. 8	−0.1	VB, St	Fair–Poor

COMPARISON STARS

No.	Diameter (Pl. 3439)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1	0.16	−47.0	+76.4	+0.152
2	.18	−40.3	+30.3	.472
3	.13	+41.0	−35.6	.066
4	.24	+46.3	−71.1	+0.310
Parallax star	0.18	− 8.9	+ 1.5	....

The mean magnitude of the comparison stars is about $10\frac{1}{2}$. The rotating sector reduced the parallax star by about four magnitudes.

TABLE 2
REDUCTIONS FOR LALANDE 30728

No.	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p\cdot v}$ in Arc
	mm					
1735	+0.157	0.5	−0.92	−525	−0.004	−0''.03
1768	.161	0.8	−0.95	−516	.000	0.00
1772	.156	0.8	−0.95	−515	− .005	−0.04
2119	.174	0.8	+0.61	−280	− .005	−0.04
2132	.190	0.4	+0.56	−274	+ .013	+0.09
2263	.184	0.8	−0.77	−183	+ .003	+0.03
2271	.185	1.0	−0.81	−179	+ .004	+0.04
2281	.182	1.0	−0.87	−172	+ .001	+0.01
2579	.200	1.0	+0.78	+ 73	+ .003	+0.63
2580	.198	0.8	+0.78	+ 73	− .001	−0.61
2608	.202	0.6	+0.58	+088	+ .003	+0.02
2757	.208	0.6	−0.60	+168	+ .006	+0.05
2786	.201	0.5	−0.72	+178	.000	0.00
3249	.220	0.7	+0.74	+440	.000	0.00
3255	.217	0.9	+0.70	+444	− .003	−0.03
3439	.228	1.0	−0.96	+584	+ .004	+0.04
3445	+0.215	0.6	−0.95	+588	−0.010	−0.09

Normal equations:

$$12.8\,c+\ \ 1.001\,\mu-2.914\,\pi=+2.473$$
$$165.261\ \ +8.547\ \ =+1.161$$
$$8.237\ \ =-0.494$$

whence

$$c=+0.1933$$
$$\mu=+0.00573=+0''.0610\qquad\mu_a=+0^s.0194$$
$$\pi=+0.00248=+0''.027\pm0''.011$$

Probable error corresponding to unit weight,

$$\pm0''.031$$

Two other determinations of the parallax have been published:

$+0''.06\pm0.035,$　　Jost, meridian circle

$+0''.040,$　　　　　Adams, spectrum

Potsdam Pl. 1214 No. 608 $(20^h56^m, 39°41')$

In measuring the field of Lalande 40728 Mr. Pettit noticed that this star has an appreciable proper motion. In Vol. III, p. 430 of the *Astrographic Catalogue*, Potsdam Zone, the photographic magnitude is given as $10^M.0$. Most of the plates for Lalande 40728 could be used for finding the parallax of the 10^M star, so that it was not necessary to start an independent set of plates. The 15 plates were measured by Mr. Pettit.

From measures in declination on the same plates Mr. Van Biesbroeck finds the yearly proper motion

$\mu' = -0''.24$. The total proper motion is consequently $0''.66$ in position angle $111°$.

TABLE 1
PLATES FOR POTSDAM PH. PL. 1214, No. 608

No.	Date	Hour Angle	Observers	Quality of Images
1735......	1914 Oct. 22	0^h0	L, J	Fair
1768......	Oct. 31	$+0.1$	J	Fair
1772......	Nov. 1	-0.1	L, J	Fair–Good
2119......	1915 June 24	$+0.2$	Su, J	Fair–Poor
2263......	Sept. 29	$+0.1$	Su, VB	Fair
2281......	Oct. 10	-0.1	VB, Su	Fair–Poor
2579......	1916 June 11	-0.1	Su, L	Fair–Good
2580......	June 11	0.0	L	Fair
2408......	June 26	-0.1	Su, Y	Fair–Poor
2786......	Sept. 24	-0.2	Su, St	Fair–Good
3249......	1917 June 13	-0.4	Su, St	Good–Fair
3255......	June 17	$+0.1$	Su, St	Fair
3257......	June 19	-0.1	Su, St	Good–Fair
3439......	Nov. 4	$+0.1$	VB, St	Fair–Good
3445......	Nov. 8	-0.1	VB, St	Good–Fair

COMPARISON STARS

No.	Diameter (Pl. 3439)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1............	0.16	-65.5	$+19.9$	$+0.391$
2............	.18	-59.0	-26.1	.257
3............	.14	$+57.3$	$+25.0$	.243
4............	.15	$+67.2$	-18.8	$+0.109$
Parallax star...	0.20	-19.4	$+ 5.1$	....

The mean magnitude of the comparison stars is about $10\frac{1}{2}$. This star was not under the sector. (See previous star.)

TABLE 2
REDUCTIONS FOR POTSDAM PH. PL. 1214, No. 608

No.	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	mm					
1735....	-0.064	0.7	-0.93	-555	-0.003	$-0''.03$
1768....	$- .055$	0.7	-0.95	-546	$+ .005$	$+ .04$
1772....	$- .063$	0.8	-0.95	-545	$- .003$	$- .03$
2119....	$- .005$	0.6	$+0.61$	-310	$+ .005$	$+ .04$
2263....	$- .004$	0.7	-0.78	-213	$+ .002$	$+ .02$
2281....	$- .007$	0.6	-0.87	-202	$- .002$	$- .02$
2579....	$+ .045$	0.8	$+0.76$	$+ 43$	$- .002$	$- .02$
2580....	$+ .040$	0.7	$+0.76$	$+ 43$	$- .007$	$- .06$
2408....	$+ .050$	0.6	$+0.58$	$+ 58$	$+ .003$	$+ .02$
2786....	$+ .049$	0.8	-0.74	$+148$	$- .003$	$- .03$
3249....	$+ .108$	0.9	$+0.74$	$+410$	$+ .003$	$+ .03$
3255....	$+ .102$	0.7	$+0.69$	$+414$	$- .003$	$- .03$
3257....	$+ .105$	0.9	$+0.67$	$+416$	$.000$	$.00$
3439....	$+ .115$	0.8	-0.95	$+554$	$.000$	$.00$
3445....	$+0.116$	0.6	-0.95	$+558$	0.000	0.00

Normal equations:

$$10.9\,c + 3.659\,\mu - 1.460\,\pi = +0.415$$
$$165.750 + 12.132 = +2.849$$
$$7.062 = +0.197$$

hence

$$c = +0.0338$$
$$\mu = +0.01589 = +0''.1692 \qquad \mu_a = +0^s.0674$$
$$\pi = +0.00758 = +0''.081 \pm 0''.009$$

Probable error corresponding to unit weight,

$$\pm 0''.022.$$

Lalande 40844 (21^h0^m, $+6°41'$)

Porter gives for this $8^M.4$ star a proper motion of $+0^s.004$, $-0''.55$ (*Publications of the Cincinnati Observatory*, No. 18, p. 50). The nineteen plates were measured by Mr. Pettit.

TABLE 1
PLATES OF LALANDE 40844

No.	Date	Hour Angle	Observers	Quality of Images
514.......	1911 Oct. 7	-0^h8	Sl, Sl	Poor
529.......	Oct. 14	-0.1	Su, Sl	Good
967.......	1912 Oct. 27	$+0.4$	Sl, M	Good
973.......	Nov. 2	$+0.4$	Sl, Sl	Good
1376.......	1913 Sept. 14	-0.4	Su, Sl	Good
1397.......	Oct. 11	0.0	Sl, Su	Good
1406.......	Oct. 25	-0.6	Sl, Sl	Good
2133.......	1915 June 30	$+0.5$	Su, L	Poor
2272.......	Oct. 3	-0.1	Su, VB	Poor
2619.......	1916 July 2	$+0.1$	Su, Y	Poor
3261.......	1917 June 21	-0.1	Su, St	Good
3264.......	June 26	-0.2	Su, L	Fair
3273.......	July 1	-0.3	Su, St	Good
3440.......	Nov. 4	$+0.5$	VB, St	Good
3817.......	1918 June 30	0.0	VB, St	Fair
3818.......	June 30	$+0.3$	VB, St	Fair
3824.......	July 2	-0.2	VB, St	Good
4105.......	Oct. 29	-0.1	VB	Fair
4106.......	Oct. 29	$+0.2$	VB	Fair

COMPARISON STARS

No.	Diameter (Pl. 3824)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1.............	0.15	-75	$+11$	$+0.256$
2.............	.17	-24	-63	.245
3.............	.22	$+36$	$+51$	.253
4.............	.14	$+63$	$+ 1$	$+0.246$
Parallax star...	0.30	$- 0.5$	$+ 0.5$	....

The sector was not used for the parallax star, but could have been used to advantage. The mean magnitude of the comparison stars is about 10.

TABLE 2
REDUCTIONS FOR LALANDE 40844

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	mm					
514....	-0.115	0.5	-0.84	-1047	-0.003	$-0''.02$
529....	.109	0.9	$- .89$	-1040	$+ .003$	$+ .03$
967....	.108	0.9	$- .94$	$- 661$	$- .004$	$- .04$
973....	.108	0.9	$- .95$	$- 655$	$- .004$	$- .04$
1376....	.095	0.9	$- .60$	$- 339$	$+ .002$	$+ .02$
1397....	.096	0.9	$- .85$	$- 312$	$+ .001$	$+ .01$
1406....	.095	1.0	$- .93$	$- 298$	$+ .002$	$+ .02$
2133....	.082	0.4	$+ .55$	$+ 314$	$- .002$	$- .01$
2272....	.094	0.4	$- .81$	$+ 410$	$- .011$	$- .07$
2619....	.061	0.4	$+ .51$	$+ 683$	$+ .011$	$+ .07$
3261....	.071	1.0	$+ .66$	$+1037$	$- .006$	$- .06$
3264....	.072	0.7	$+ .59$	$+1042$	$- .007$	$- .06$
3273....	.062	1.0	$+ .53$	$+1047$	$+ .003$	$+ .03$
3440....	.066	0.9	$- .95$	$+1173$	$+ .002$	$+ .02$
3817....	.062	0.8	$+ .52$	$+1411$	$- .004$	$- .04$
3818....	.051	0.8	$+ .52$	$+1411$	$+ .007$	$+ .07$
3824....	.059	1.0	$+ .53$	$+1413$	$- .001$	$- .01$
4105....	.064	0.6	$- .95$	$+1532$	$- .004$	$- .03$
4106....	-0.060	0.7	-0.95	$+1532$	0.000	0.00

The normal equations are:

$$14.7\,c + 65.569\,\mu - 4.182\,\pi = -1.181$$
$$1528.849 + 38.730 = -2.618$$
$$8.659 = +0.474$$

from which

$$c = -0.088$$
$$\mu = +0.0020 = +0\rlap{.}''021 \qquad \mu_a = +0\rlap{.}^s0051$$
$$\pi = +0.0031 = +0\rlap{.}''033 \pm 0\rlap{.}''014$$

Probable error corresponding to unit weight,

$$\pm 0.0028 = \pm 0\rlap{.}''030$$

The following parallaxes have been obtained:

$+0\rlap{.}''156 \pm 0\rlap{.}''054$,   Elkin, heliometer
$+0\rlap{.}''096$,   Adams, spectrum

1 Pegasi (21^h17^m, $+19°23'$)

This is the brighter component of Σ 11, App. II. The magnitude is 4.2 and the spectral type is K. The proper motion is $+0\rlap{.}^s0072$ and $+0\rlap{.}''058$ according to Boss. The present parallax is based on nine plates. These were measured by Mr. Yowell and Miss Gushee, and the means of their solutions were used in deriving the parallax and proper motion.

TABLE 1

Plates of 1 Pegasi

No.	Date	Hour Angle	Observers	Quality of Images
341......	1910 Nov. 5	$+0\rlap{.}^h7$	St	Poor
496......	1911 Sept. 16	+0.2	Su. St	Good
1683......	1914 Sept. 12	−0.2	Su. L	Good
2140......	1915 July 4	−0.2	Su	Good
2141......	July 4	+0.2	Su. L	Good
2245......	Sept. 0	−0.1	Su. L	Good
2249......	Sept. 18	−0.2	VB. L	Good
2602......	1916 June 20	−0.1	Su. L	Fair
2609......	June 26	0.0	L	Good

COMPARISON STARS

No.	Diameter (Pl. 496)	X (Right Ascension)	Y (Declination)	Dependence
	mm	½ mm	½ mm	
1............	0.12	−262	+134	+0.255
2............	.15	−193	−138	.169
3............	.15	+170	−161	.220
4............	.11	+285	+165	+0.356
Parallax star...	0.22	+ 39.6	+ 34.2	....

The average magnitude of the comparison stars is about 11. The sector was used.

TABLE 2

Reductions for 1 Pegasi

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p} \cdot v$ In Arc
	½ mm					
341....	−0.086	0.6	−0.94	−1422	−0.011	−0″02
496....	− .038	.9	− .56	−1107	+ .012	+ .03
1683....	+ .028	.9	− .69	− 1	+ .002	− .01
2140....	+ .054	.8	+ .55	+ 280	− .002	− .01
2141....	+ .043	.7	+ .55	+ 280	− .014	− .03
2245....	+ .060	.8	− .47	+ 347	+ .003	+ .01
2249....	+ .056	.7	− .59	+ 356	− .001	.00
2602....	+ .092	.6	+ .71	+ 632	+ .009	+ .02
2609....	+0.086	0.8	+0.64	+ 638	+0.003	+0.01

The normal equations are:

$$6.8\,c - 0.140\,\mu - 0.715\,\pi = +0.224$$
$$318.409 + 19.100 = +2.411$$
$$2.745 = +0.128$$

whence

$$c = +0.034$$
$$\mu = +0.0074 = +0\rlap{.}''020 \qquad \mu_a = +0\rlap{.}^s0050$$
$$\pi = +0.0045 = +0\rlap{.}''012 \pm 0\rlap{.}''012$$

Probable error corresponding to unit weight,

$$\pm 0.0045 = \pm 0\rlap{.}''020$$

The value $+0\rlap{.}''020 \pm 0\rlap{.}''009$ has been published by the Allegheny Observatory.

71 g Cygni (21^h26^m, $+46°6'$)

This $5\rlap{.}^M3$ star, which is Br 2799, belongs to the spectral type K. The yearly proper motion in right ascension is $+0\rlap{.}^s0044$ according to Boss's *Preliminary General Catalogue*, while $+0\rlap{.}^s0035$ is found here from an interval of three years only. The 17 plates were measured by Mr. Van Biesbroeck.

TABLE 1

Plates for 71 g Cygni

No.	Date	Hour Angle	Observers	Quality of Images
2309......	1915 Oct. 21	$-0\rlap{.}^h3$	VB. L	Good
2316......	Oct. 27	−0.3	L. VB	Fair–Poor
2331......	Oct. 30	−0.3	L	Good
2349......	Nov. 6	−0.1	L	Good
2626......	1916 July 4	+0.1	Su	Good
2644......	July 9	0.0	Su. L	Good–Fair
2902......	Nov. 3	−0.4	St. L	Fair
3258......	1917 June 19	−0.1	Su. St	Good
3262......	June 21	−0.1	Su. St	Good
3265......	June 26	−0.2	Su. L	Fair
3275......	July 1	+0.1	Su. St	Good
3276......	July 3	−0.3	Su. L	Fair
3446......	Nov. 8	−0.2	VB. St	Fair–Poor
3447......	Nov. 8	+0.1	VB. St	Fair
3811......	1918 June 26	+0.1	VB	Good
4130......	Nov. 10	+0.1	VB	Fair
4151......	Nov. 13	+0.1	VB. HP	Fair

No.	Diameter (Pl. 3811)	X (Right Ascension)	Y (Declination)	Dependence
	mm	¼ mm	¼ mm	
1............	0.25	−322	−125	+0.211
2............	.21	−212	+230	.327
3............	.15	+436	+124	.288
4............	.17	+ 98	−229	+0.174
Parallax star...	0.17	+ 5.4	+ 44.4	....

The mean magnitude of the comparison stars is about $9\frac{1}{2}$. The rotating sector reduced the apparent brightness of the parallax star by about five magnitudes.

TABLE 2

REDUCTIONS FOR 71 g CYGNI

No.	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	¼ mm					
2309....	−0.042	1.0	−0.881	−512	−0.013	−0″03
2316....	+ .002	0.5	− .909	−506	+ .032	+ .06
2331....	− .010	1.0	− .920	−503	+ .020	+ .05
2349....	− .029	1.0	− .937	−496	+ .001	.00
2626....	− .005	1.0	+ .571	−255	+ .008	+ .02
2634....	− .032	0.8	+ .503	−250	− .020	− .05
2902....	− .022	0.7	− .933	−133	− .006	− .01
3258....	+ .003	1.0	+ .747	+ 95	+ .001	.00
3262....	− .006	1.0	+ .727	+ 97	− .008	− .02
3265....	+ .009	0.7	+ .672	+102	+ .008	+ .02
3275....	+ .005	1.0	+ .612	+107	+ .004	+ .01
3276....	− .010	0.7	+ .587	+109	− .011	− .03
3446....	+ .005	0.5	− .940	+237	+ .007	+ .01
3447....	− .029	0.7	− .940	+237	− .027	− .06
3811....	+ .025	1.2	+ .674	+467	+ .010	+ .03
4130....	+ .035	0.7	− .941	+604	+ .013	+ .03
4151....	−0.007	0.9	−0.940	+607	−0.019	−0.05

Normal equations:

$$14.4\,c − 0.515\,\mu − 1.730\,\pi = −0.093$$
$$174.834 + 9.482 = +0.709$$
$$9.091 = +0.091$$

hence

$$c = −0.006$$
$$\mu = +0.00377 = +0″0010 \qquad \mu_a = +0^s0035$$
$$\pi = +0.00502 = +0″013 \pm 0″008$$

Probable error corresponding to unit weight,

$$\pm 0″025$$

B.D. 53°2911 (22ʰ28ᵐ, +53°16′)

In 1912 this tenth-magnitude star was found by J. Balanowsky of Pulkowa to have the appreciable proper motion of 1″23 per year. Several values are now available: Balanowsky (*Mitteilungen der Nikolai-Hauptsternwarte zu Pulkowo*, Vol. V [1912], p. 22) from photographs one year apart gets $\mu_a = +0^s136$, $\mu' = +0″15$. From comparison with B.D. place 1855–1911 he finds $+0^s154$, $+0″34$. A. Bemporad (*Memorie della Società degli Spettroscopisti Italiani*, Vol. I [1912], p. 95) from change in

position in 10 years, $+0^s165$ and $+0″06$. The present discussion yields $\mu_a = +0^s1531$. The ten plates used here were measured by Mr. Lee.

TABLE 1

PLATES OF B.D. 53°2911

No.	Date	Hour Angle	Observers	Quality of Images
962.......	1912 Oct. 26	−0ʰ1	M, Su	Good
1005.......	Nov. 17	−0.1	M, Sl	Good
1265.......	1913 June 21	−1.2	Su, Sl	Good
1448.......	Dec. 13	+0.3	Sl	Good
1612.......	1914 July 4	−0.3	Su, L	Fair
1695.......	Oct. 1	−0.2	J, L	Good
1738.......	Oct. 22	−0.2	Su, L	Fair
2624.......	1916 July 3	0.0	Su	Good
2635.......	July 9	−0.5	Su, L	Good
2636.......	July 9	−0.1	Su, L	Good

COMPARISON STARS

No.	Diameter (Pl. 962)	X (Right Ascension)	Y (Declination)	Dependence
	mm	¼ mm	¼ mm	
1............	0.11	−84	0	+0.571
2............	.16	+30	+43	.244
3............	.13	+54	−43	+0.185
Parallax star...	0.20	−30.7	+ 2.5	....

The mean magnitude of the comparison stars is about 10.5. The rotating sector was not used.

TABLE 2

REDUCTION FOR B.D. 53°2911

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	¼ mm					
962....	−0.070	1.0	−0.775	−677	+0.009	+0″02
1005....	− .049	1.0	− .905	−655	.000	.00
1265....	+ .264	1.0	+ .858	−439	− .010	− .03
1448....	+ .504	1.0	− .881	−264	+ .001	− .00
1612....	+ .820	0.7	+ .756	− 61	+ .013	+ .03
1695....	+ .912	1.0	− .502	+ 28	− .008	− .02
1738....	+ .940	0.7	− .742	+ 49	− .007	− .02
2624....	+1.826	1.0	+ .760	+669	− .012	− .03
2635....	+1.862	1.0	+ .700	+675	+ .016	+ .04
2636....	+1.845	1.0	+0.705	+675	−0.001	0.00

The normal equations are:

$$9.4\,c + 0.030\,\mu − 0.030\,\pi = + 8.326$$
$$251.365 + 23.584 = +35.771$$
$$5.534 = + 3.361$$

whence

$$c = +0.885$$
$$\mu = +0.1412 = +0″3757 \qquad \mu_a = +0^s1531$$
$$\pi = +0.0102 = +0″027 \pm 0″012$$

Probable error corresponding to unit weight,

$$\pm 0.0091 = \pm 0″024$$

σ Pegasi (22ʰ47ᵐ, +9°18′)

This 5ᴹ3 star belongs to the spectral type F. It is also Lalande 44739. Boss gives the following value for the proper motion:

$$\mu = +0.0347 \qquad \mu' = +0.043$$

The thirteen plates of this star were measured by Mr. Van Biesbroeck.

TABLE 1
PLATES OF σ PEGASI

No.	Date	Hour Angle	Observers	Quality of Images
2319.......	1915 Oct. 27	0ʰ0	VB, L	Fair
2351.......	Nov. 6	−0.3	L, VB	Good
2370.......	Nov. 14	−0.3	L, VB	Good
2393.......	Dec. 9	0.0	VB	Fair*
3832.......	1918 July 9	−0.1	VB, St	Good–Fair
3843.......	July 11	+0.1	VB, St	Fair–Poor
3845.......	July 13	0.0	VB, St	Fair
3846.......	July 13	+0.3	VB, St	Good
3850.......	July 16	0.0	VB, St	Fair
3851.......	July 16	+0.3	VB, St	Good
4090.......	Oct. 9	+0.1	VB, Su	Fair
4156.......	Nov. 13	+0.1	VB, HP	Good
4178.......	Nov. 14	0.0	VB, HP	Good

* One exposure only.

COMPARISON STARS

No.	Diameter (Pl. 4156)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1.............	0.15	−86.9	−16.0	+0.211
2.............	.20	−11.1	+58.6	.198
3.............	.18	− 7.7	−84.7	.205
4.............	.14	+39.7	+28.7	.194
5.............	.18	+66.0	+13.4	+0.192
Parallax star...	0.15	− 1.7	− 1.0	....

The mean magnitude of the comparison stars is about 10. A reduction of five magnitudes in the apparent brightness of the parallax star was obtained by means of the rotating sector.

TABLE 2
REDUCTIONS FOR σ PEGASI

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (ε)	$\sqrt{p}\cdot\varepsilon$ in Arc
	mm					
2319....	+0.053	0.7	−0.735	−717	−0.004	−0ʺ04
2351....	.058	1.0	− .818	−707	.000	.00
2370....	.060	1.0	− .866	−699	+ .002	+ .02
2393....	.063	0.5	− .906	−674	+ .002	+ .02
3832....	.185	0.8	+ .754	+269	− .003	− .03
3843....	.190	0.5	+ .735	+271	+ .002	+ .02
3845....	.186	0.7	+ .715	+273	− .002	− .02
3846....	.188	1.0	+ .715	+273	− .001	− .01
3850....	.193	0.7	+ .683	+276	+ .004	+ .04
3851....	.191	1.0	+ .683	+276	+ .002	+ .02
4090....	.198	0.7	− .518	+361	+ .003	+ .03
4156....	.194	1.0	− .862	+396	− .004	− .04
4178....	+0.198	1.0	−0.867	+397	+0.001	+0.01

The normal equations are:

$$10.6\,c + \quad 0.848\,\mu - \quad 1.396\,\pi = \quad 1.605$$
$$233.191 \quad +19.555 \quad = +3.170$$
$$6.277 \quad = +0.064$$

from these

$$c = +0.151$$
$$\mu = +0.0127 = +0.136 \qquad \mu_a = +0.0334$$
$$\pi = +0.00406 = +0.043 \pm 0.009$$

Probable error corresponding to unit weight,

$$\pm 0.020$$

The following values for the parallax of σ Pegasi have been published:

Parallax	Observer	Method
+0.011 ±0.081........	Chase	Heliometer
+0.060 ±0.032........	Flint	Meridian Circle
+0.052..............	Adams	Spectrum

β 80 (23ʰ14ᵐ, +4°52′)

This 8ᴹ0 star is β G.C. 12290. Porter gives a proper motion of +0.0321, −0.110 (*Publications of the Cincinnati Observatory*, No. 18, p. 55). The two components of the binary differ by about one magnitude, but their distance is too small to give separate images on the plate. The thirteen plates were measured by Mrs. Pettit.

TABLE 1
PLATES OF β 80

No.	Date	Hour Angle	Observers	Quality of Images
1433.......	1913 Nov. 16	−0ʰ1	Su, St	Fair*
1635.......	1914 July 25	+0.4	Su, L	Fair*
1638.......	Aug. 2	+0.1	Su, L	Good*
1835.......	Nov. 23	+0.4	J, Su	Good
1875.......	Dec. 19	0.0	J, L	Good
2371.......	1915 Nov. 14	−0.1	VB, Su	Fair*
2644.......	1916 July 10	−0.3	Su, L	Poor*
2660.......	July 14	0.0	Su, L	Good
2668.......	July 18	−0.2	Su, L	Good*
2680.......	July 25	0.0	Su, L	Good*
2918.......	Nov. 5	−0.2	Su, L	Fair
2972.......	Nov. 30	−0.2	L, St	Good
2984.......	Dec. 17	+0.3	St, L	Good

* One exposure only.

COMPARISON STARS

No.	Diameter (Pl. 2972)	X (Right Ascension)	Y (Declination)	Dependence
	mm	¼ mm	¼ mm	
1.............	0.13	−271	+106	+0.353
2.............	.24	− 13	−264	.251
3.............	.14	+284	+158	+0.396
Parallax star...	0.25	+ 13.7	+ 33.8	....

The sector was used for the parallax star. The mean magnitude of the comparison stars is about 11.

TABLE 2

REDUCTIONS FOR β 80

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	¼ mm					
1433....	−0.327	0.5	−0.83	−635	−0.005	−0″01
1635....	− .219	0.6	+ .66	−384	− .011	− .02
1638....	− .192	0.6	+ .58	−376	+ .012	+ .02
1835....	− .152	1.0	− .87	−264	− .004	− .01
1875....	− .146	1.0	− .89	−237	− .011	− .03
2371....	+ .063	0.5	− .83	+ 93	+ .034	+ .06
2644....	+ .139	0.5	+ .80	+332	− .009	− .02
2660....	+ .142	0.9	+ .77	+336	− .008	− .02
2668....	+ .155	0.7	+ .73	+340	+ .003	+ .01
2680....	+ .163	0.6	+ .66	+347	+ .008	+ .02
2918....	+ .219	0.8	− .75	+450	+ .012	+ .03
2972....	+ .214	1.0	− .90	+475	− .005	− .01
2984....	+0.216	0.8	−0.89	+492	−0.011	−0.03

The normal equations are:

$$9.5\,c + 9.152\,\mu - 2.058\,\pi = +0.290$$
$$139.630 + 0.116 = +6.777$$
$$6.082 = +0.039$$

from which

$$c = −0.017$$
$$\mu = +0.0495 = +0″132 \qquad \mu_a = +0^s032$$
$$\pi = −0.0004 = −0″001 \pm 0″009$$

Probable error corresponding to unit weight,

$$\pm 0.0076 = \pm 0″020$$

Other values of the parallax have been obtained as follows:

Parallax	Observer	Method
+0″01 ±0″06	Elkin	Heliometer
+0.058 ±0.109........	Jewdokimov	Meridian Circle
+0.005 ±0.007........	McCormick Observatory	Photography

Munich I 32805 (23ʰ45ᵐ, +2°19′)

Porter (*Publications of the Cincinnati Observatory*, No. 18, p. 57) gives for this 8^M5 star a proper motion +0^s031, +0″17. This star is also B.D. +2°4723. The fourteen plates were measured by Miss Steele.

TABLE 1

No.	Date	Hour Angle	Observers	Quality of Images
1732.......	1914 Oct. 21	−0ʰ2	Su, J	Fair
1746.......	Oct. 24	−0.1	Su, J	Fair
1776.......	Nov. 1	−0.4	Su, J	Good
2176.......	1915 Aug. 8	+0.3	Su	Fair
2181.......	Aug. 14	+0.5	Su	Fair
2335.......	Oct. 30	−0.1	VB, Su	Fair
2342.......	Oct. 31	+0.1	VB, Su	Good
2353.......	Nov. 6	−0.3	Su, L	Good
2662.......	1916 July 16	−0.1	Y	Fair*
2675.......	July 20	0.0	Y	Good
2681.......	July 25	−0.1	Su, L	Good
2682.......	July 25	+0.3	Su, L	Fair
4236.......	1918 Dec. 15	+0.1	VB, HP	Good
4237.......	Dec. 15	+0.4	VB, HP	Fair

* One exposure only.

COMPARISON STARS

No.	Diameter (Pl. 1776)	X (Right Ascension)	Y (Declination)	Dependence
	mm	mm	mm	
1.............	0.25	+45	−39	+0.201
2.............	.14	+38	−69	.200
3.............	.12	+50	+78	.205
4.............	.15	−59	+50	.199
5.............	.27	−74	−20	+0.195
Parallax star...	0.18	+ 0.75	+ 0.44	....

The sector was used for the parallax star. The mean magnitude of the comparison stars is about 10.

TABLE 2
REDUCTIONS FOR MUNICH I 32805

Plate	Solution (m)	Weight (p)	Parallax Factor (P)	Time in Days (t)	Residual (v)	$\sqrt{p \cdot v}$ in Arc
	mm					
1732....	−0.104	0.7	−0.48	−523	0.000	0″00
1746....	− .098	0.7	− .53	−520	+ .006	+ .05
1776....	− .104	1.0	− .63	−512	− .001	− .01
2176....	− .067	0.7	+ .60	−232	+ .001	+ .01
2181....	− .068	0.8	+ .55	−226	− .001	− .01
2335....	− .058	0.7	− .62	−149	+ .004	+ .03
2342....	− .064	1.0	− .61	−148	− .002	− .02
2353....	− .065	1.0	− .69	−142	− .003	− .03
2662....	− .035	0.5	+ .83	+111	− .006	− .04
2675....	− .024	1.0	+ .80	+115	+ .004	+ .04
2681....	− .030	1.0	+ .75	+120	− .001	− .01
2682....	− .026	0.8	+ .75	+120	+ .003	+ .03
4236....	+ .066	0.8	− .90	+993	+ .003	+ .03
4237....	+0.062	1.0	−0.90	+993	−0.001	−0.01

The normal equations are:

$$11.7\,c + 1.943\,\mu - 1.266\,\pi = −0.494$$
$$259.922 − 5.612 = +2.781$$
$$5.820 = +0.013$$

from which

$$c = −0.44$$
$$\mu = +0.0111 = +0″119 \qquad \mu_a = +0^s0290$$
$$\pi = +0.0034 = +0″036 \pm 0″009$$

Probable error corresponding to unit weight,

$$\pm 0.0021 = \pm 0″022$$

The parallax −0″022 ±0″033 has been obtained by Russell photographically.

SUMMARY OF RESULTS FOR FIFTY-TWO STARS (VAN BIESBROECK AND HANNAH STEELE PETTIT)

Star	R.A. 1900	Decl. 1900	B.D. Number	Magnitude and Spectrum	Proper Motion	Relative Parallax	Probable Error	No. of Plates	Probable Error of One Plate
Anonymous.........	0h 45m	+57° 45'	....	11.5, —	1".50	+0".055	±0".008	11	±0".017
48 ω Andromedae	1 22	+44 53	+44° 307	5.0, F5	0.36	+ .001	.016	10	.035
γ Ceti................	2 38	+ 2 49	+ 2 422	3.6, A	0.21	+ .045	.005	15	.015
ι Persei.............	3 2	+49 14	+49 857	4.2, G	1.27	+ .064	.015	9	.033
W.B. II, 3h167........	3 11	+30 40	+30 516	9.2, —	0 28	+ .029	.010	18	.027
A.G. Berlin II 1232....	3 46	+22 23	+22 583	8.0, —	0.39	+ .035	.008	11	.019
Groombridge 745......	3 48	+75 53	+75 154	8.2, —	0.65	+ .048	.006	14	.015
α Tauri............	4 30	+16 18	+16 629	1.1, K5	0.20	+ .047	.010	19	.032
β Tauri	5 20	+28 31	+28 795	1.8, B8	0.36	+ .005	.011	15	.031
δ Aurigae	5 51	+54 17	+54 970	3.9, K	0.15	+ .018	.013	12	.036
A.G. Cambr. E. 2935..	6 0	+26 34	+26 1067	8.9, —	0.45	+ .015	.006	14	.018
Oxf. phot. 25°21321....	6 10	+25 15	+25 1188	9.2, —	0.42	+ .048	.009	10	.020
α Geminorum A......	7 28	+32 6	+32 1581	2.0, A}	0.22	+ .063	.008	17	.025
B.				2.9, A}		+ .053	.010	17	.030
α Canis Minoris......	7 34	+ 5 29	+ 5 1739	0.5, F5	1.24	+ .307	.009	15	.025
W.B. II, 7h1029......	7 38	+39 49	+39 2001	7.0, —	0.68	+ .021	.010	12	.021
ζ Cancri A and B.....	8 6	+17 57	+18 1867	4.7, F}	0.16	+ .057	.010	16	.031
C....				6.1, F}		+ .077	.010	16	.030
B.D. +67°552........	8 27	+67 38	+67 552	9.3, —	1.08	+ .106	.009	11	.024
Lalande 19022........	9 37	+43 10	+43 1953	8.0, —	0.82	+ .067	.008	15	.020
Lalande 19229........	9 43	+14 14	+14 2151	8.0, —	0.83	+ .005	.015	12	.035
7 Sextantis...........	9 47	+ 2 55	+ 3 2280	5.9, A	0.92	+ .057	.008	11	.015
Lalande 21185.......	10 58	+36 38	+36 2147	7.5, —	4.77	+ .382	.011	9	.022
B.D. +28°2078......	12 1	+28 3	+28 2078	9.1, —	0.41	+ .017	.022	14	.044
δ Corvi............	12 25	-15 58	-15 3482	3.1, A	0.25	+ .020	.005	15	.014
β 612	13 35	+11 15	+11 2589	5.5, A	0.11	+ .019	.008	14	.018
Σ 1835 A............	14 18	+ 8 54	+ 9 2882	5.1, A}	0.07	+ .012	.012	15	.029
B and C....				6.6, —}		+ .016	.015	12	.032
A.G. Cambr. E 7086...	15 3	+25 3	+25 2874	9.2, —	0.99	+ .079	.008	20	.019
γ Coronae.........	15 39	+26 37	+26 2722	3.9, A	0.11	− .007	.012	12	.029
W.B. I, 16h400........	16 24	+ 3 29	+ 3 3203	9.0, —	0.53	+ .027	.015	11	.032
ζ Herculis...........	16 38	+31 47	+31 2884	3.0, G	0.60	+ .095	.010	18	.029
41 Herculis A.........	16 39	+ 6 17	+ 6 3288	7.0, —}	0.35	+ .011	.010	13	.020
B.				10.0, —}		+ .014	.007	12	.014
β G.C. 7783	16 48	+28 50	+28 2624	7.0, —	....	+ .021	.008	20	.024
Lalande 31055......	17 0	− 4 54	− 4 4225	7.5, —	1.47	+ .050	.012	9	.022
77 χ Herculis.........	17 24	+48 21	+48 2517	5.8, A	0.20	+ .009	.006	10	.013
β G.C. 8038......	17 25	− 0 59	− 0 3300	5.3, G	0.21	+ .057	.015	11	.030
26 Draconis...........	17 34	+61 57	+61 1678	5.3, F	0.56	+ .107	.010	10	.021
Barnard's proper motion star........	17 53	+ 4 25	....	9.7, Mb	10.30	+ .509	.006	17	.016
α Lyrae..............	18 34	+38 41	+38 3238	0.1, A1	0.35	+ .114	.010	17	.027
27 b' Cygni......	20 3	+35 42	+35 3959	5.5, K	0.50	+ .045	.007	14	.016
β Delphini	20 33	+14 15	+14 4369	3.7, F5	0.11	+ .043	.006	10	.012
Lalande 40728......	20 56	+39 52	+39 4400	6.9, —	0.32	+ .027	.011	17	.031
Potsdam Pl. 1214 No. 608..........	20 56	+39 41	....	10.0, —	0.66	+ .081	.009	15	.022
Lalande 40844......	21 0	+ 6 41	+ 6 4741	8.4, —	0.55	+ .033	.014	19	.030
1 Pegasi.............	21 17	+19 23	+19 4691	4.2, K	0.12	+ .012	.012	9	.020
71 g Cygni........	21 26	+46 6	+45 3558	5.3, K	0.11	+ .013	.008	17	.025
B.D. +53°2011......	22 28	+53 16	+53 2911	10.0, —	1.23	+ .027	.012	10	.024
σ Pegasi..............	22 47	+ 9 18	+ 9 5122	5.3, F	0.52	+ .043	.009	13	.020
β 80	23 14	+ 4 52	+ 4 4994	8.0, —	0.49	− .001	.009	13	.020
Munich I 32805......	23 45	+ 2 19	+ 2 4723	8.5, —	0.50	+0.036	± 0.009	14	±0.022

ERRATA IN PART I OF THIS VOLUME

Page 57:　*Summary table*, Z Herculis, Probable Error,

for 0".010
read 0".009

Page 59:　In Index of Parallaxes, for the star Lalande 23223,

for right ascension 10h 20m
read　　　　　　　　　　12h 20m